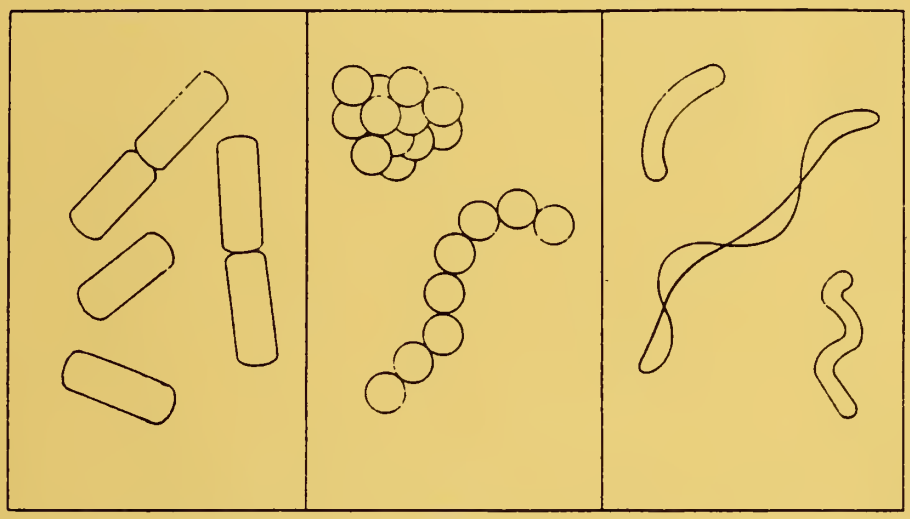
United States Department of the Interior

NATIONAL PARK SERVICE

Gateway National Recreation Area

1990 WATER QUALITY SAMPLING PROGRAM



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Division of Natural Resources and Compliance

United States Department of the Interior

NATIONAL PARK SERVICE

Gateway National Recreation Area

GATEWAY NATIONAL RECREATION AREA
DIVISION OF RESOURCE MANAGEMENT
AND COMPLIANCE

1990 WATER QUALITY SAMPLING PROGRAM

APPROVED BY: _____

General Superintendent

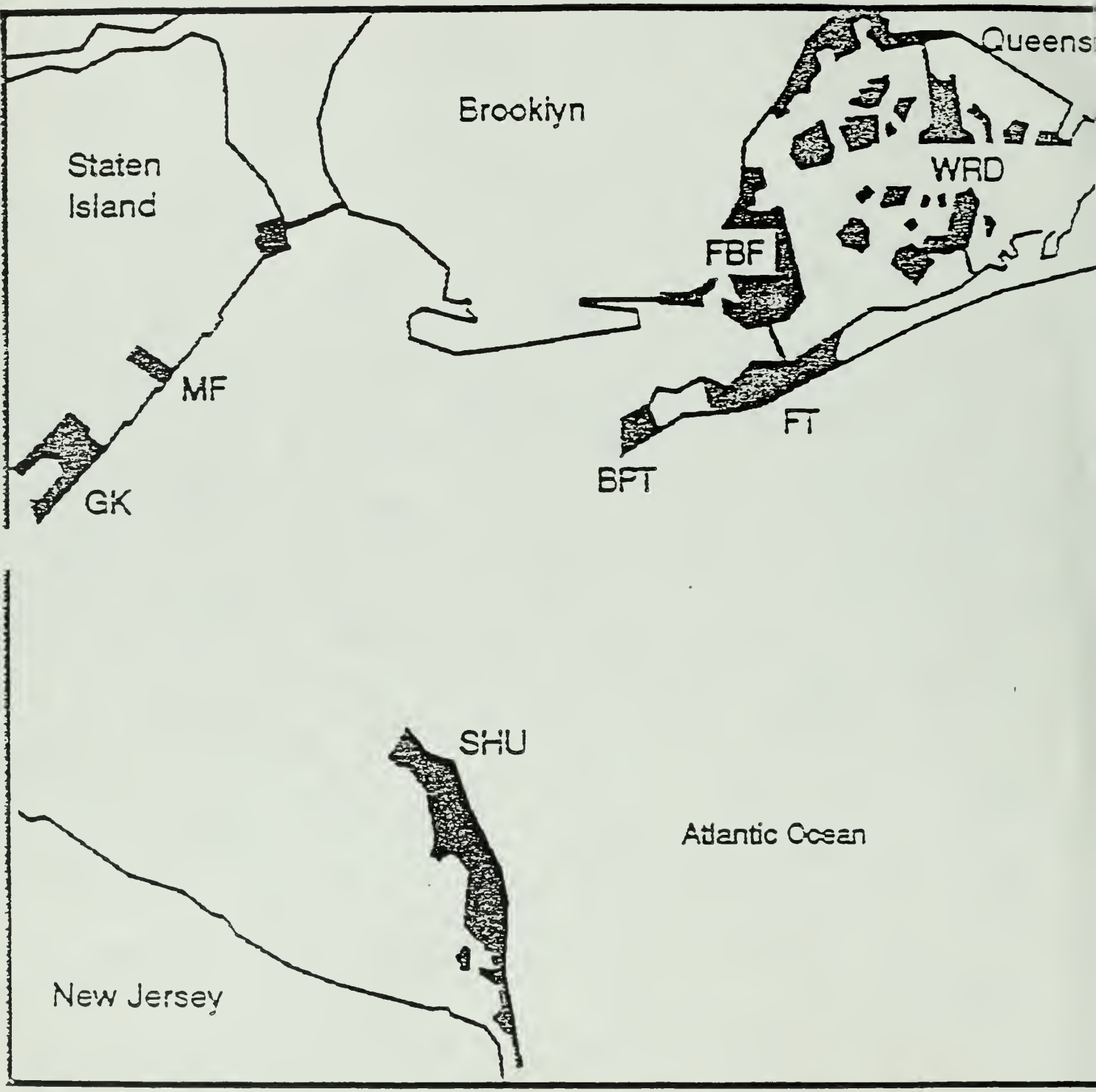
REVIEWED BY: _____

John T. Tanacredi, Ph. D.
Chief, Division of Resource Management and Compliance

PREPARED BY: _____

E. Ann Scaglione
Water Quality Specialist

DATE: _____



Gateway

National Recreation Area
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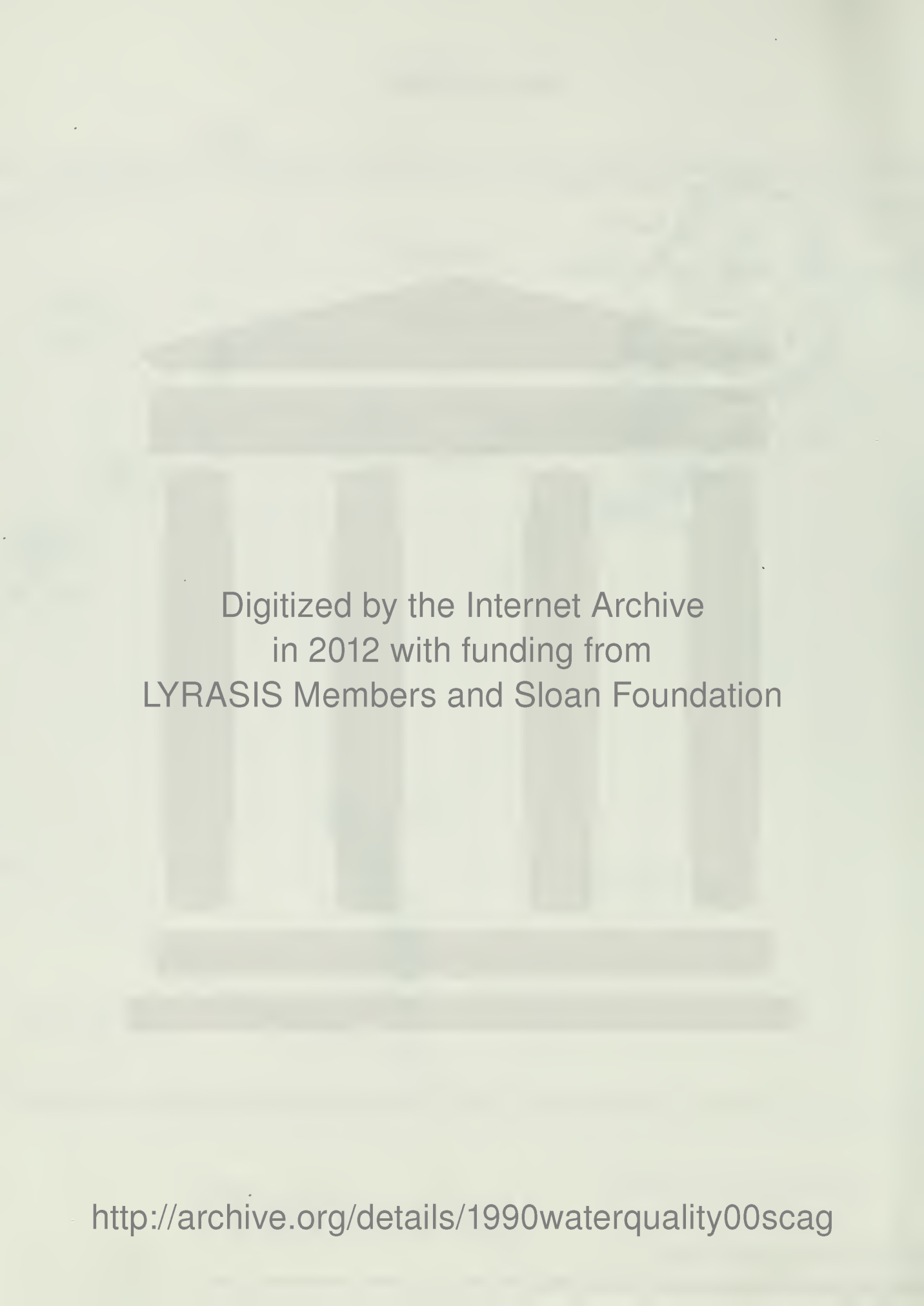

I. BACKGROUND AND HISTORY

Gateway's Water Quality Program was initiated in 1977 to form a data base for the management of park waters for public health and ecological quality. Water quality data were collected for the following purposes:

1. To monitor bacterial levels at public beaches under Gateway jurisdiction for compliance with city, state and federal public health standards.

2. To monitor bacterial levels at other sites within the park to determine trends in water quality.

3. To identify potential long-term acceptable beach sites.

4. To provide data for the evaluation and review of Gateway's Natural Resources Management Plan regarding fish and wildlife management as well as visitor public health and safety.

The sampling program has been evolving since its inception with gradual refinements in technique and methodology (Cerniglia, 1981). Identical sample sites and methods have been used from 1981 to the present. Twenty-two sites are sampled in Breezy Point, Jamaica Bay and Staten Island during the beach season (Memorial Day to Labor Day). In 1984 three additional sites were added in Marine Park. In 1988 six new sites were added to include the beaches of Gateway National Recreation Area at Sandy Hook Unit. The basis for water quality classification is total and fecal coliform measurements which are obtained for each site using the Membrane Filter Method.

Coliforms are indicator species, or microorganisms whose densities can be related quantitatively to swimming associated health hazards. The concern is with infectious, enteric diseases, such as cholera and typhoid fever, whose etiological agents are excreted in feces and are spread by water and food contaminated with fecal wastes (Cabelli, 1983).

Several studies have shown a correlation between epidemiological health effects in swimmers and total fecal coliform counts in recreational bathing waters, (Stevenson, 1953, Cabelli et. al., 1983 and Rosenberg, 1976). Current standards however, have been challenged in recent literature, maintaining that measurements more specific to particular groups of coliform bacteria (Enterococci in particular) are better indicators of swimming related illness (Cabelli, et. al., 1983). Total coliform counts of 2400/100ml and fecal coliform counts of 200/100ml, however, remain the respective New York State and Federal limits and have the following advantages:

1. Relative simplicity and accuracy of measurement with the Membrane Filter Method (Approved in Standard Methods).

2. Speed of Results: Counts are available within 24 hours of filtration.

3. Ease of comparison with previous data. Changing to a new type of measurement would make comparisons and trend analysis difficult.

4. Measurement of a broader spectrum of coliform bacteria insures the inclusion of most potential pathogens.

II. POLLUTION SOURCES

1. Raw Sewage/Treated Sewage - In the past approximately 190 million gallons per day of raw sewage were discharged from the west side of Manhattan and the Red Hook section of Brooklyn, (NYC DEP, 1979). Completion of the North River Water Pollution Control (WPCP) in April 1986 and the Red Hook WPCP in June 1987 eliminated the discharge of dry weather sewage from Manhatten and Brooklyn. Of the average 1.6 billion gallons per day of dry weather flow that NYDCDEP's WPCPs currently receive, approximately 60% receives full secondary treatment, 30% modified secondary treatment, and 10% advanced primary treatment. Three of four plants that provide less than full secondary treatment (North River, Owls Head, and Coney Island) are currently under construction to attain this level; Newton Creek is in the facility design phase, and will achieve full secondary threatment in the 1990's. Sewers currently being constructed in the Tottenville area of Staten Island will eliminate the last 0.5 mgd of raw seage discharged from New York City.

2. Combined Sewage Overflow (CSO's) - Combined sewers function during dry weather as sanitary sewers conveying all flows to Water Pollution Control Plants. During wet weather, large volumes of rainfall runoff enter the system, increasing flows up to fifty times. Regulators are built into the system to avoid flooding the plants. During and after rainfall, the regulators allow up to twice the average daily flow to reach the plants and divert the remainder to nearby waterways as CSO's. More than 70% of the sewered area in New York City is served by CSO's and they are a major source of intermittent pollution. Several alternative plans have been considered by the city (chlorination of CSO's during rain events is one example) to reduce their effect (NYC DEP, 1979).

3. Landfills - Although not detectable by bacterial counts, landfills on the northern rim of Jamaica Bay have been implicated as a possible source of water pollution.

III. WATER QUALITY TRENDS

1. Breezy Point/Sandy Hook

The beaches of Breezy Point, the Rockaways, and Sandy Hook are Gateway's cleanest and have been consistently acceptable for bathing over the years tested. This year exceptionally low counts of bacteria were found at both sites.

2. Jamaica Bay

The waters of Jamaica Bay are the most heavily impacted in Gateway National Recreation Area. The sewage treatment plants and CSO's emptying into Jamaica Bay combine with its poor flushing action (35 day residence time) to produce consistently high average total and fecal coliform counts in periferal channels and poor water circulation areas such as Grassy Bay, (10). The Bay's waters are classified as unacceptable for bathing. This year the water quality in the bay did improve over the previous year's seasonal averages.

3 Staten Island

Water Quality at sample sites in Staten Island have been marginal in past years, with South Beach (SB2) being officially closed to swimming by the New York City Department of Health. Other sites have seasonal averages below city and federal standards (2400/100ml total, 200/100ml fecal coliform) but show occasional unhealthy counts throughout the bathing season. Water Quality at Great Kills Beach (GK6) and Crookes Pointe (CP7) in the Staten Island Unit have been consistently acceptable over the years studied. This year the National Park Service beaches in Staten Island were open throughout the entire beach season and exhibited a marked improvement in water quality.

4. Marine Park

In 1986 Marine Park was added to the areas regularly tested for coliform bacteria. Three different sites in the park were monitored; MP-1, MP-2, and MP-3. This year the bacterial counts were similar to those obtained in 1989 which were higher than those obtained in 1988, but are still within the criteria for clean water. It appears, that incoming and outgoing tides carry sewage away before it has a chance to enter Marine Park in any appreciable amounts. Any future shoreline development in Jamaica Bay should be monitored to see if the beneficial effect of the tides are altered.

IV. METHODS

SAMPLING AND COLIFORM TESTING

Sampling and Membrane Filter culture methods followed standard EPA procedures for wastewater analysis (Bordner and Winter, eds., 1978) with minor modifications. Gateway's Revised Operations Manual for Bacteriological Analysis of Beach Water using the Membrane Felter Technique (Simon, 1984) provides a detailed description of methods used. Total and fecal coliform measurements were obtained for all sample sites (see Table I) on a weekly basis between Memorial Day and Labor Day. In Jamaica Bay and Marine Park surface samples were collected by boat; while Staten Island, Breezy Point, and Sandy Hook samples were collected by wading into the surf zone.

Samples were stored on ice and analyzed using the Membrane Filter Method. In this method, an appropriate volume of water is passed through a membrane filter that retains the bacteria present in the sample. The filter is then incubated on the appropriate selective and differential media for 24 hours. Number of colonies counted on a given filter indicates the number of bacteria present in the volume of sample filtered. (Bordner and Winter, 1978, Gateway 1981).

Based on data from previous years for all sites sampled, a standard dilution scheme for each site was developed to optimize the number of countable plates obtained (see Table I). However, due to unusual conditions in Staten Island an additional dilution scheme had to be used (see Table II). (NOTE: The maximum filtered volume used (30ml) is less than ideal for accurately measuring bacterial densities of less than 67/100ml but greater volumes caused filter clogging from the relatively turbid waters sampled). Data were recorded for sampling time, unusual water conditions if any counts for each dilution and were summarized on weekly data sheets.

Standard counts (colonies/100ml) were calculated for each site using the following formula:

Count/100ml = # colonies counted/vol filtered X 100ml

The densities for each site were calculated to be the arithmetic means of the dilutions that showed 20-200 colonies for that week.

$$\text{Count/100ml} = \frac{\text{colony count} + \text{colony count} + \text{colony count}}{\text{Vol. 1} + \text{Vol. 2} + \text{Vol. 3}} \times 100$$

If no plates were found to have less than 200 colonies for a given site, the smallest volume sampled was used to calculate density. If the plate was completely overgrown and no count could be made, the density was determined by dividing 200 colonies by the smallest volume filtered.

V. DISCUSSION

1. WATER QUALITY TRENDS

Water quality classification, based on New York State and Federal criteria, has remained the same in all three units. Breezy Point sites have been classified as acceptable, Jamaica Bay sites as unacceptable and Staten Island sites acceptable (but marginal over short periods) for bathing.

Total coliform counts have shown a marked increase from 1982 - 1985, but they have dropped back in 1986 and 1987 (see Table III). This years counts are significantly lower than last year's. Fecal coliforms, considered to be the more reliable indication of the risk of enteric disease, have not shown the same trend, with levels remaining relatively constant over the same period.

It is expected that water quality will improve significantly over the next decade as water pollution control facilities are upgraded in the New York area.

2. FACTORS EFFECTING WATER QUALITY

The quality of the waters surrounding Gateway is determined largely by pollutant inputs such as treated and untreated sewage, CSO's, industrial effluents, ocean dumping of sewage sludge and toxic waste leachates. The concentrations of these pollutants are controlled by chemical, physical, and biological processes in the marine environment (Dyer, 1973).

Total and fecal coliforms serve as nonconservative tracers of sewage related pollution (Dyer, 1973). They are nonconservative in the sense that they are rapidly removed from the marine environment by dieaway and incorporated into the sediments and decreases in their concentrations are not solely dependent on their physical transport and diffusion. Dieaway for total coliforms in Jamaica Bay was estimated to be 1.3 days and 1.5 days for fecal coliforms (Cardenas, 1983).

3. WATER QUALITY EMERGENCIES

In the past, Gateway's policy for the protection of public health at bathing beaches has been to officially close beaches by public notice when individual samples with total coliform values greater than 2400/100ml and fecal coliforms greater than 200/100ml are detected over a three day period at a given beach. Although this is an effective response to a persistent problem, it does leave a three day period during which bathers are potentially exposed to unhealthy concentrations of coliform organisms. Recent literature indicates that swimmers stand a much greater risk of contacting disease from polluted water than nonswimmers when swimmers are defined as those who undergo total immersion (Cabelli, 1983). Some stop gap measure is necessary to protect beachgoers during the three day decision-making period.

The following procedures are provided. When a sample determined to have greater than 200/100ml fecal coliform and greater than 2400/100ml total coliform count is collected at one of Gateway's beaches:

(1) Immediately contact the Water Quality Specialist, who will notify the Superintendent of the unit effected of the potential problem and advise to alert lifeguards to look for unusual odors, fecal matter, algae, oil, or grease in water or on beach and to pull swimmers from the water at their discretion.

(2) Check with New York City Health Department to determine if any overflow incident or accidental release of raw sewage has occurred at local sewage treatment plants. Advise park's Chief, Division of Resource Management and Compliance and document conversation with New York City Health Department.

(3) Collect 5 samples at different locations (at least 50 yards apart) on the suspect beach and filter volumes of 30, 10, and 1ml for each sample.

Swimmers should be prevented from bathing by lifeguards if any of the following is observed:

(1) Elevated average total (greater than 2400/100ml) and fecal coliform (greater than 200/100ml) counts of replicate samples.

(2) Presence of oil, grease, or fecal matter in water or on beach in large quantities.

(3) Accidental spillage of raw sewage or of any toxic substance in the waters adjacent to the beach which may adversely effect public health.

(4) Any other environmental incident which may be detrimental to the health and safety of the bathers.

Swimmers should be kept out of the water as long as replicate testing continues to show elevated coliform levels or other adverse environmental conditions persist. This will allow continued public access to the beach while still protecting the public health. If these conditions persist for three days or more, however, the beach should be closed officially by public notice and should remain closed until water quality has returned to normal safe levels. It is the responsibility of the park's Water Quality Specialist to carefully document water quality and environmental conditions when beach closure is considered. A looseleaf laboratory notebook is to be carefully maintained for each seasons data. The notebook should contain all data and summary sheets and be used as a log for all laboratory and field operations.

4. DATA

Data at all sites showed high variability. This variability is due largely to error implicit in the method (Fleisher and McFadden, 1979) and the rest is a result of environmental factors.

5. PRECIPITATION

Precipitation is a known cause of intermittent decreases in water quality. It produces shock loading of pollutants to local waters by storm waters and combined sewage overflows. (NYC DEP, 1979)

Total and fecal coliform counts have been consistently higher following rainfall in local waters (NYC Department of Health, 1983, Cernigla, 1981).

6. TIDES

Tidal currents and tidal flushing account for much of the transport and dilution in estuaries (Dyer, 1973). Sampling at Gateway sites is performed irrespective of tidal state.

7. WATER QUALITY PARAMETERS

Water quality parameters include dissolved oxygen (DO), temperature, pH, salinity, and conductivity. These are taken at both the surface and bottom of all sites in Jamaica Bay and Marine Park in order to better access the physical characteristics of these waters throughout the season.

Dissolved oxygen is a common measurement of biological significance. Since it is essential to all life, it's shortage or absence limits the distribution of plants and animals. Depending on temperature, fishes may become distressed at concentrations of less than 5mg/L. At lower temperatures they may tolerate less than 1mg/L.

Oxygen dissolved in the water is a function of barometric pressure, temperature, salinity, and proportion of oxygen in the air. However, temperature and salinity cause the greatest variables in the amounts of dissolved oxygen.

Jamaica Bay is an estuary and therefore a highly changeable environment. It is a harsh physical and chemical environment caused by the mixing of salt and fresh waters that are rarely the same temperature. This creates salinity and temperature gradients throughout the bay, which fluctuate on a daily basis with tidal cycles. Incoming waters from runoff during heavy rains, CSO's, and sewage treatment plants carry suspended organic and inorganic matter as well.

The most important physical information about a body of water is temperature. The temperature profoundly influences the lives of all marine plants and animals. Plants and most marine animals, except mammals, assume the same or almost the same temperature as the water. These plants and animals are adapted to a normal seasonal temperature regime and are commonly affected adversely by unusual temperatures.

Temperature also controls density of water in ways that determine the entire temperature structure of all waters. It also alters the solubility and physiological effects of solids and gases entering a water system.

pH is the measure of hydrogen ion concentration. Values outside the range of 4.5 to 10 are detrimental to fish. The pH of the open sea generally ranges from 8.1 to 8.3 in the surface layer. At the depth of the layer of minimum oxygen, the pH may be about 7.5. Stagnant basins rich in hydrogen sulfide exhibit low pH readings of 7.0.

Salinity is the total amount of solid materials in grams contained in 1 Kg of seawater when all the carbonate has been converted to oxide, the bromine and iodine replaced by chlorine, and the organic matter completely oxidized. Seawater is a mixture of proportions of the halide, carbonate, and sulfate salts of sodium, magnesium, calcium, potassium, and strontium together with small quantities of other substances and minute traces of many other elements.

The salinity of the open ocean varies only from about 33% to 37%. It tends to vary more in the estuarine environment because of fresh water input and evaporation along shorelines. Also, the change in salinity due to tidal cycles causes rapid fluctuations and are biologically significant because they restrict plants and animals to the variations which they can accommodate.

Halocines, an increase of salinity with depth, may exist at the bottom of a mixed surface layer.

Conductivity is a numerical expression of the ability of an aqueous solution to carry an electric current. This ability depends on the presence of ions, their total concentration, mobility, valence, and relative concentrations. Conductivity is important in determining the inorganic content of water, the effect of the total concentration of ions on chemical equilibria, the physiological effect on plants and animals, and the corrosion rate of the environment.

8. DATA ANALYSIS

Weekly and seasonal average total and fecal coliform values for each sample site and the five areas studied were calculated and are listed on Tables VI, thru XXIV. Seasonal trends in total and fecal coliform densities for 1990 are graphically depicted for all sites in Figures 1 thru 126.

RECOMMENDATIONS FOR THE 1991 WATER QUALITY SAMPLING PROGRAM

Based on analysis of the water quality program and considering the improved capabilities and equipment of the Natural Resource Water Quality Laboratories, the following modifications and projections are sugessted to be in effect for the water quality program in 1991:

1. A data base file has been established for all water quality data and should simplify data retrieval and statistical analysis. However, statistical programs should be purchased or developed for analysis of variance and determining correlation between the water quality data and environmental factors.

2. Other parameters should be included in Gateway's sampling program. These include; ammonia, nitrates, nitrites, TDS,some significant metals and more complete analysis of water particularly in the areas of the landfills.

3. Time should be made available to further identify the plankton species in Jamaica Bay as some species are related to water quality parameters.

4. Given time, staffing, and funding, it would be ideal to establish new water quality sites at the heads and mouths of Sheepshead Bay, Paerdergat Basin, and Shellbank Basin to determine the output of coliform from these very populated sources.

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VII. TABLES AND FIGURES

EACH SITE STUDIED

EACH AREA STUDIED

MAPS

TABLE I

DILUTIONS (VOLUMES) BY SITE FOR MF ANALYSIS

	SITE	VOLUMES TO BE FILTERED	
		TOTAL	FECAL (ml)
STATEN ISLAND	SB-2	30, 10, 3	30, 10, 3
	MB-3	30, 10, 3	30, 10, 3
	NDB-4	30, 10, 3	30, 10, 3
	OB-5	30, 10, 3	30, 10, 3
	GK-6	30, 10, 3	30, 10, 3
	CP-7	30, 10, 3	30, 10, 3
	GKM-8	30, 10, 3	30, 10, 3
BREEZY POINT	ATL-1	30, 30, 10	30, 30, 10
	ATL-2	30, 30, 10	30, 30, 10
JAMAICA BAY	RI-3	30, 10, 1	30, 10, 1
	MPB-4	30, 10, 3	30, 10, 3
	JB-5	30, 10, 3	30, 10, 3
	JB-6	30, 10, 3	30, 10, 3
	JB-6A	30, 10, 3	30, 10, 3
	JB-7	30, 10, 3	30, 10, 3
	JB-8	30, 10, 3	30, 10, 3
	JB-9	30, 10, 1	30, 10, 1
	JB-10	30, 10, 3	30, 10, 3
	JB-11	30, 10, 3	30, 10, 3
MARINE PARK	MP-1	30, 10, 3	30, 10, 3
	MP-2	30, 10, 3	30, 30, 3
	MP-3	30, 10, 3	30, 10, 3

example: smallest volume filtered = 3ml

$$\frac{200 \text{ colonies}}{3\text{ml}} \times 100 = 6{,}667/100\text{ml}$$

The density would then be logged as 6,667/100ml

TABLE II

DILUTIONS (VOLUMES) BY SITE FOR MF ANALYSIS

	SITE	VOLUMES TO BE FILTERED	
		TOTAL	FECAL (ml)
STATEN ISLAND	SB-2	10, 5, 3	10, 5, 3
	MB-3	10, 5, 3	10, 5, 3
	NDB-4	10, 5, 3	10, 5, 3
	OB-5	10, 5, 3	10, 5, 3
	GK-6	10, 5, 3	10, 5, 3
	CP-7	10, 5, 3	10, 5, 3
	GKM-8	10, 5, 3	10, 5, 3
BREEZY POINT	ATL-1	10, 5, 3	10, 5, 3
	ATL-2	10, 5, 3	10, 5, 3
JAMAICA BAY	RI-3	10, 5, 3	10, 5, 3
	MPB-4	10, 5, 3	10, 5, 3
	JB-5	10, 5, 3	10, 5, 3
	JB-6	10, 5, 3	10, 5, 3
	JB-6A	10, 5, 3	10, 5, 3
	JB-7	10, 5, 3	10, 5, 3
	JB-8	10, 5, 3	10, 5, 3
	JB-9	10, 5, 3	10, 5, 3
	JB-10	10, 5, 3	10, 5, 3
	JB-11	10, 5, 3	10, 5, 3
MARINE PARK	MP-1	10, 5, 3	10, 5, 3
	MP-2	10, 5, 3	10, 5, 3
	MP-3	10, 5, 3	10, 5, 3
SANDY HOOK	SH-1	10, 5, 3	10, 5, 3
	SH-2	10, 5, 3	10, 5, 3
	SH-3	10, 5, 3	10, 5, 3
	SH-4	10, 5, 3	10, 5, 3
	SH-5	10, 5, 3	10, 5, 3
	SH-6	10, 5, 3	10, 5, 3

example: smallest volume filtered = 1ml

$$\frac{20 \text{ colonies}}{1\text{ml}} \times 100 = 2{,}000/100\text{ml}$$

The density would then be logged as 2,000/100ml

TABLE III

GATEWAY TOTAL AND FECAL COLIFORM SEASONAL AVERAGES (COUNT/100ML)

1982-1990

	BREEZY POINT		JAMAICA BAY		STATEN ISLAND		MARINE PARK		SANDY HOOK	
YEAR	T	F	T	F	T	F	T	F	T	F
1982	15	8	588	217	229	71				
1983	19	14	1631	1150	466	229				
1984	242	18	2955	500	1812	87				
1985	307	37	3513	429	3508	42				
1986	21	7	176	277	47	23	35	36		
1987	37	21	731	277	589	307	167	49		
1988	85	29	694	336	464	261	208	45	78	43
1989	401	77	3077	1324	401	77	1097	266	2450	29
1990	38	27	932	301	408	105	454	69	56	20

1 - Cerniglia, 1982 2 - Mancuso, 1983 3 - Simon 4 - Jones

TABLE IV

JUNE, JULY, AND AUGUST PRECIPITATION FOR NEW YORK AREA

	JUNE	JULY	AUGUST	TOTAL
LONGTERM AVERAGE	3.66	5.38	6.23	15.25
1986	1.86	5.56	4.42	11.66
1987	4.22	3.71	3.84	11.77
1988	1.29	8.14	2.19	11.62
1989	8.47	5.99	8.35	22.81
1990	2.50	3.51	12.36	18.37

TABLE V

SAMPLE DAYS SURPASSING WATER QUALITY CRITERIA

SITE	TOTAL NO. OF SAMPLE DAYS	SAMPLE DAYS SURPASSING CRITERIA	%
ATL-1	16	0	0
ATL-2	15	0	0
BREEZY POINT AVERAGE	15.5 DAYS	0 DAY	0
RI-3	15	1	6.6
MPB-4	15	2	13.0
JB-5	15	2	13.0
JB-6	15	1	6.6
JB-6A	15	1	6.6
JB-7	15	1	6.6
JB-8	15	2	13.0
JB-9	15	7	47.0
JB-10	15	2	13.0
JB-11	15	0	0
JB-12	15	1	6.6
JB-13	15	2	13.0
JB-14	15	2	13.0
JAMAICA BAY AVERAGE	15 DAYS	1.6 DAYS	.12
SB-2	16	0	0
MB-3	16	0	0
NDB-4	16	0	0
OB-5	15	0	0
GK-6	18	1	.05
CP-7	15	0	0
GKM-8	15	1	.05
STATEN ISLAND AVERAGE	15.9 DAYS	2 DAYS	.02
MP-1	15	0	0
MP-2	15	0	0
MP-3	15	0	0
MARINE PARK AVERAGE	15 DAYS	0 DAYS	0

Table VI

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY21 TO AUGUST 27, 1990
Site RI-3
Rockaway Inlet

Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
5-22	261	0	11.8	11.8	8.1	8.2	8.6	8.5	408	407	24.4	22.3
6-1	1595	0	15.3	15.0	8.1	8.1	8.0	7.5	378	379	22.7	22.6
6-7	783	0	15.0	14.9	7.7	8.1	7.2	6.9	419	420	*	*
6-12	986	0	14.8	14.4	8.8	8.3	8.1	7.8	443	442	27.4	26.5
6-18	319	0	19.2	19.0	7.8	8.3	8.3	7.6	431	431	26.7	26.5
6-25	29	0	19.5	17.2	8.1	8.5	7.2	7.6	439	454	27.5	28.2
7-3	1711	29	22.3	21.5	8.3	8.3	6.9	6.5	380	376	26.6	27.1
7-12	667	319	18.3	18.4	8.3	8.0	8.7	*	371	364	28.3	27.7
7-16	3683	1653	21.0	20.9	7.8	8.8	8.3	8.2	371	370	26.5	26.7
7-23	435	87	21.7	21.7	8.1	7.9	7.3	8.1	399	397	28.4	28.2
7-30	2278	1139	24.5	24.4	8.0	7.9	8.4	10.3	408	407	27.4	27.2
8-7	377	58	23.5	23.4	8.5	*	3.0	2.8	416	409	28.2	28.0
8-13	134	0	24.8	24.7	7.8	*	4.6	*	387	390	25.7	26.1
8-22	2010	1072	21.1	21.2	8.1	8.2	7.0	5.8	355	330	25.9	23.9
8-27	884	68	21.9	21.8	7.6	7.5	5.0	5.0	383	382	27.1	27.0
onal												
ages	1077	295	19.6	19.4	8.1	8.2	7.1	7.1	399	397	26.6	26.3

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Confluent
=Too Numerous To Count

SH-1	15		0	0
SH-2	15		0	0
SH-3	15		0	0
SH-4	15		0	0
SH-5	15		0	0
SH-6	15		0	0
SANDY HOOK AVERAGE	15	DAYS	0 DAYS	0

Table VII

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site MPB-4 Marine Park Bridge

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	261	0	12.2	12.3	8.3	8.2	8.3	8.1	391	391	22.1	22.2
2	6-1	493	0	15.8	15.3	8.3	8.2	8.2	7.2	374	375	22.6	22.4
3	6-7	58	0	17.2	16.2	8.2	8.3	8.2	6.5	397	408	*	*
4	6-12	1711	348	16.2	15.3	8.2	8.3	8.2	7.6	410	433	25.0	26.8
5	6-18	754	0	19.7	18.9	8.2	8.4	10.3	8.0	412	426	26.8	28.0
6	6-25	232	29	19.3	18.4	8.2	8.3	7.6	7.2	441	451	27.9	25.3
7	7-3	3828	1334	23.0	18.7	8.2	7.7	5.1	4.2	414	449	26.7	26.9
8	7-12	841	290	20.0	19.9	*	*	*	*	373	374	27.4	27.5
9	7-16	1566	58	21.9	21.5	8.2	8.4	9.6	9.2	369	348	25.9	24.7
10	7-23	1334	145	22.1	22.0	7.8	7.8	*	*	404	390	28.5	27.5
11	7-30	335	134	24.8	24.6	8.2	8.1	5.5	4.3	396	388	26.4	26.0
12	8-7	738	145	23.6	23.0	8.4	*	6.8	6.1	393	408	27.0	28.2
13	8-13	670	67	25.0	24.9	7.7	*	4.9	*	391	398	25.9	26.5
14	8-21	2412	2278	20.9	20.9	7.5	7.6	4.8	5.2	385	395	27.6	28.9
15	8-27	1020	68	22.9	21.9	7.5	7.6	4.8	5.2	374	371	26.0	26.2
Seasonal Averages		1084	326	20.3	19.6	8.1	8.1	7.1	6.6	395	400	26.1	26.2

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table VIII

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-5 Ruffle Bar

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	348	0	13.0	12.9	8.4	8.3	8.8	8.6	396	397	20.6	20.6
2	6-1	493	0	15.8	15.5	8.4	8.3	8.2	7.7	375	376	22.5	22.2
3	6-7	58	0	18.6	18.3	7.9	8.4	9.2	8.5	368	371	22.4	23.2
4	6-13	29	0	16.9	16.2	9.1	8.7	8.2	7.3	421	423	25.5	25.9
5	6-18	377	0	19.3	19.3	8.2	8.5	9.4	9.4	411	418	28.1	28.6
6	6-25	58	0	21.6	20.2	8.5	8.5	10.1	7.6	420	431	26.1	27.4
7	7-3	522	203	23.3	21.3	8.2	7.9	5.3	4.2	412	430	24.7	26.9
8	7-12	406	232	21.1	20.8	*	*	*	*	375	375	27.0	27.0
9	7-16	1015	87	22.4	21.3	8.2	8.4	9.2	8.2	368	367	25.7	26.1
10	7-23	1682	737	23.8	22.0	7.8	7.9	8.9	7.5	395	388	26.7	27.3
11	7-30	67	0	25.1	24.8	7.3	8.2	6.2	4.9	392	395	26.0	26.5
12	8-7	870	174	24.4	24.0	8.4	*	7.0	6.2	393	390	26.5	26.5
13	8-13	1340	268	25.4	25.2	7.8	*	4.5	*	397	397	26.1	26.3
14	8-21	3819	4020	21.3	20.9	6.8	7.7	4.8	5.0	378	394	26.9	28.3
15	8-27	3196	340	23.4	22.4	7.5	7.5	5.1	5.2	368	364	25.6	25.5
Seasonal Averages		952	404	21.0	20.3	8.0	8.2	7.5	6.9	391	394	25.4	25.9

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table IX

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-6 Canarsie Pier

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1218	0	13.5	13.4	8.4	8.4	8.4	8.1	384	390	20.3	20.7
2	6-1	348	0	16.4	15.9	8.3	8.3	7.3	7.2	366	373	21.6	22.3
3	6-7	841	0	18.7	17.2	8.3	8.4	8.1	6.9	359	385	*	*
4	6-13	58	0	17.9	16.6	8.8	8.6	9.5	7.4	396	414	24.3	25.4
5	6-18	58	0	21.2	19.2	8.8	8.6	10.8	8.1	398	407	27.6	28.9
6	6-25	145	29	22.5	21.8	8.5	8.6	10.8	8.9	387	404	24.0	25.2
7	7-3	203	0	23.1	22.6	7.7	8.2	4.6	3.2	380	390	23.5	24.0
8	7-12	319	29	22.6	21.9	*	*	*	*	370	369	25.8	25.9
9	7-16	2378	261	23.0	22.4	8.2	8.5	8.1	7.5	356	363	24.4	25.2
10	7-23	1885	203	25.2	24.5	8.2	7.9	8.1	8.8	389	393	25.8	26.3
11	7-30	1273	201	24.9	24.9	8.1	8.1	4.3	4.3	370	392	24.5	26.1
12	8-7	CON	TNTC	25.1	24.9	8.2	*	4.6	3.2	377	383	25.1	25.5
13	8-13	938	268	26.1	25.4	7.8	*	7.2	*	388	380	25.3	24.7
14	8-21	1005	201	21.7	21.8	5.3	7.7	4.6	5.2	369	371	25.6	26.2
15	8-27	680	68	23.6	22.8	7.9	7.5	6.8	5.0	358	360	24.5	25.1
Seasonal Averages		811	90	21.7	21.0	8.0	8.2	7.4	6.4	376	384	24.5	25.1

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table X

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-6A Fresh Creek

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1334	0	13.5	13.6	8.4	8.4	8.7	8.0	384	387	20.5	20.8
2	6-1	290	0	16.4	16.2	8.3	8.2	7.1	6.8	358	368	21.3	21.5
3	6-7	203	0	18.8	17.6	8.3	8.3	6.7	5.5	360	379	*	*
4	6-13	348	0	18.0	17.4	8.6	8.6	9.4	7.8	384	403	22.1	22.9
5	6-18	87	58	20.9	20.1	8.7	8.7	12.7	10.0	386	392	27.9	28.4
6	6-25	232	29	22.6	21.8	8.6	8.6	9.0	7.6	389	404	24.1	25.1
7	7-3	203	87	23.6	23.1	8.1	8.1	4.0	2.9	376	379	23.0	23.4
8	7-12	609	87	22.7	22.7	*	*	*	*	366	361	25.2	25.0
9	7-16	1276	174	23.0	22.8	7.8	7.9	7.9	7.6	355	346	24.3	23.8
10	7-23	400	1856	25.3	24.8	8.1	7.9	6.9	4.9	380	390	25.0	25.9
11	7-30	1273	804	25.1	25.1	7.9	7.9	4.1	2.5	372	379	24.6	25.1
12	8-7	CON	TNTC	25.2	25.0	8.2	*	4.5	4.0	366	381	24.2	25.3
13	8-13	1742	402	26.1	25.9	7.8	*	6.7	*	366	373	23.5	24.3
14	8-21	737	268	21.9	22.0	7.4	7.6	4.8	5.8	365	361	25.5	25.2
15	8-27	884	0	24.0	22.9	7.5	7.5	5.8	4.6	349	353	23.7	24.4
Seasonal Averages		687	269	21.8	21.4	8.1	8.1	7.0	6.0	370	377	23.9	24.4

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XI

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-7 Pumpkin Patch Channel

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1798	0	14.2	14.2	8.3	8.3	7.4	7.4	374	375	20.6	20.5
2	6-1	261	0	16.4	16.3	8.4	8.3	7.9	7.1	351	362	21.1	20.8
3	6-7	1334	377	18.6	18.5	8.2	8.5	7.4	6.1	356	357	*	*
4	6-13	377	0	18.6	17.7	8.5	8.5	8.3	7.1	380	377	22.5	23.1
5	6-18	174	29	21.0	19.9	8.5	8.6	9.4	8.9	386	391	27.7	28.4
6	6-25	493	87	22.6	22.5	8.4	8.6	8.7	7.9	382	383	23.9	23.6
7	7-3	319	87	24.0	23.5	7.9	8.2	4.8	4.6	380	386	23.3	23.7
8	7-12	1247	261	23.1	23.0	*	*	*	*	361	362	24.7	24.8
9	7-16	1421	116	23.6	22.8	8.0	7.9	8.0	8.0	353	357	24.0	24.6
10	7-23	725	1276	25.5	25.4	8.0	7.9	6.6	6.1	380	377	25.0	24.7
11	7-30	402	134	25.2	24.9	8.0	7.9	2.4	2.8	373	385	24.6	25.7
12	8-7	CON	TNTC	25.2	25.1	8.0	*	4.9	3.5	360	360	23.7	23.8
13	8-13	1742	134	26.0	25.8	7.8	*	6.0	*	376	369	24.4	24.0
14	8-21	871	469	22.4	22.1	7.3	7.5	4.6	4.8	363	368	25.3	25.7
15	8-27	3060	748	24.3	22.9	7.7	7.5	6.2	5.2	352	328	23.8	22.6
Seasonal Averages		1016	266	22.0	21.6	8.1	8.1	6.6	6.1	368	369	23.9	24.0

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XII

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-8 North Channel Bridge

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	CON	29	14.2	14.0	8.3	8.2	6.9	6.4	374	378	20.5	20.7
2	6-1	841	29	16.7	16.4	8.4	8.3	7.9	7.1	351	362	21.1	20.8
3	6-7	2599	0	18.7	18.2	8.1	8.4	7.5	5.7	354	357	*	*
4	6-13	29	0	18.9	18.0	8.7	8.5	7.5	4.7	376	387	22.5	20.8
5	6-18	406	0	21.3	20.2	8.7	8.7	10.3	8.7	372	383	27.3	28.0
6	6-25	841	174	22.9	22.1	8.3	8.5	10.4	5.1	381	371	23.7	24.6
7	7-3	435	116	23.8	23.5	7.9	8.0	3.3	2.7	390	390	22.9	23.1
8	7-12	1044	348	23.7	23.2	*	*	*	*	359	357	24.3	24.4
9	7-16	1218	174	23.6	23.1	8.0	8.3	8.1	7.9	358	355	24.3	24.3
10	7-23	928	2733	25.8	25.5	8.3	8.3	5.5	*	369	365	24.1	23.9
11	7-30	335	402	25.2	25.2	8.0	7.9	3.0	1.1	368	358	24.2	23.0
12	8-7	CON	TNTC	25.0	25.1	7.9	*	6.0	4.8	331	315	21.7	20.6
13	8-13	1876	670	26.2	25.6	7.4	*	5.2	*	369	250	23.7	18.9
14	8-21	1407	67	22.9	22.4	7.2	7.4	3.8	2.6	359	357	24.5	24.9
15	8-27	3060	748	23.9	23.2	7.5	7.4	6.2	1.4	347	345	23.4	23.6
Seasonal Averages		1155	392	22.2	21.7	8.1	8.2	6.5	4.5	364	355	23.4	23.0

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XIII

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-9 Grassy Bay

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1566	0	14.3	14.4	8.3	8.2	7.5	2.6	373	362	20.5	20.6
2	6-1	CON	TNTC	16.9	16.4	8.6	7.9	9.2	5.0	350	357	20.8	21.3
3	6-7	1073	0	18.5	18.3	8.3	8.4	6.3	6.6	350	358	*	*
4	6-13	3067	0	18.6	18.2	*	*	*	*	366	371	22.0	22.3
5	6-18	580	58	22.1	20.0	9.1	8.6	10.0	6.8	373	370	27.1	28.2
6	6-25	145	29	22.7	21.8	8.5	8.3	8.5	4.6	381	396	23.7	25.1
7	7-3	377	29	23.6	23.5	8.0	8.2	3.5	3.2	386	390	22.7	23.5
8	7-12	CON	8000	23.5	23.2	*	*	*	*	358	359	24.3	24.7
9	7-16	CON	TNTC	23.8	22.8	8.4	7.8	8.1	6.6	356	356	24.0	24.4
10	7-23	4800	1072	25.8	25.6	8.3	8.1	*	*	363	293	23.5	18.9
11	7-30	134	134	25.2	25.1	8.0	7.9	2.9	1.4	358	379	23.5	25.0
12	8-7	CON	CON	25.3	25.3	7.2	*	3.0	2.3	335	377	21.9	24.9
13	8-13	5000	1139	26.7	25.6	7.7	*	5.5	*	360	337	23.0	21.9
14	8-21	1072	335	23.1	22.8	7.2	7.2	3.8	4.0	344	348	23.5	23.8
15	8-27	CON	TNTC	23.8	22.6	8.4	7.4	7.1	2.6	344	337	23.4	23.1
Seasonal Averages		1781	981	22.3	21.7	8.2	8.0	6.3	4.2	360	359	23.1	23.4

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XIV

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-10 Winhole Channel

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1334	0	14.1	13.7	8.3	8.2	8.3	6.4	367	379	21.0	20.9
2	6-1	1392	0	16.8	16.0	8.6	8.3	8.3	5.7	352	365	21.0	21.9
3	6-7	145	0	18.6	17.9	8.3	8.3	7.1	5.4	353	361	*	*
4	6-13	5800	0	18.8	18.0	8.9	8.5	9.9	4.6	365	389	21.8	21.1
5	6-18	203	0	20.7	18.5	8.4	7.9	9.8	1.6	378	383	27.7	29.2
6	6-25	87	0	23.5	22.1	9.2	8.7	16.4	7.3	374	388	23.2	24.6
7	7-3	928	145	24.4	23.5	8.1	8.2	3.9	3.2	365	365	24.0	24.6
8	7-12	87	29	23.3	23.4	*	*	*	*	352	368	24.0	25.0
9	7-16	145	0	23.6	22.2	8.2	*	6.3	6.0	360	351	24.3	24.6
10	7-23	1798	290	26.2	25.4	8.8	*	*	*	370	383	23.9	25.2
11	7-30	268	67	25.4	25.2	8.1	7.9	3.4	1.5	368	377	24.2	24.9
12	8-7	CON	TNTC	25.0	25.2	7.8	*	2.9	2.8	345	346	23.0	24.8
13	8-13	1809	469	26.2	25.4	7.6	*	6.4	*	371	376	24.1	24.7
14	8-21	938	335	23.5	22.4	7.3	7.2	4.2	4.6	356	359	24.1	24.8
15	8-27	CON	1632	24.5	22.4	8.6	7.4	7.6	2.6	332	342	22.1	23.7
Seasonal Averages		1149	212	22.3	21.4	8.3	8.1	7.3	4.3	361	369	23.5	24.3

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XV

TOTAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-11 Subway Tressel

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	203	29	14.0	13.9	8.4	8.4	8.3	7.9	381	371	20.8	20.8
2	6-1	145	0	16.7	16.0	8.6	8.4	8.1	6.4	360	363	21.6	21.2
3	6-7	0	0	17.8	17.3	8.1	8.3	6.8	6.3	368	376	*	*
4	6-13	0	0	18.1	17.9	9.0	8.8	7.9	8.0	388	390	23.5	23.8
5	6-18	29	0	20.3	20.2	8.1	8.5	8.9	8.6	389	388	27.3	27.1
6	6-25	0	58	22.5	21.9	8.7	8.6	10.4	7.7	396	401	24.8	25.0
7	7-3	87	29	23.6	23.0	7.9	7.9	4.7	2.9	390	397	24.5	24.5
8	7-12	261	29	22.5	22.8	*	*	*	*	370	368	25.7	25.5
9	7-16	1769	58	22.5	22.5	7.8	7.9	8.0	7.8	365	351	25.3	24.6
10	7-23	464	116	25.3	24.6	8.0	7.8	*	*	391	388	25.8	26.0
11	7-30	67	0	25.3	25.3	7.9	7.9	3.6	2.5	382	385	25.3	25.3
12	8-7	116	58	25.2	25.0	7.8	*	3.0	2.5	387	380	25.6	25.0
13	8-13	469	67	25.9	25.6	7.6	*	5.7	*	391	390	25.6	25.5
14	8-21	335	268	22.9	22.6	7.4	7.3	4.2	4.8	365	361	25.2	24.9
15	8-27	204	0	24.4	23.6	8.6	7.4	7.4	5.4	361	359	24.1	24.4
Seasonal Averages		277	47	21.8	21.5	8.1	8.1	6.7	5.9	379	378	24.7	24.5

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XVI

TOTAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-12 Jo Co Marsh

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	493	0	14.2	14.5	8.5	8.3	8.1	6.6	379	381	20.6	21.2
2	6-1	435	0	17.3	15.5	8.7	8.2	8.8	3.7	356	376	21.5	22.2
3	6-7	116	0	18.4	17.6	8.4	8.3	8.0	5.5	357	370	*	*
4	6-13	29	0	18.9	18.2	8.5	8.4	6.7	5.3	367	384	22.2	21.3
5	6-18	0	0	21.3	19.4	8.6	8.2	12.6	4.0	372	389	26.5	28.8
6	6-25	0	29	22.8	21.8	8.8	8.5	12.9	6.0	391	399	24.3	25.2
7	7-3	174	29	23.0	22.9	8.2	8.3	3.7	3.5	399	396	24.7	24.8
8	7-12	261	29	24.0	23.5	*	*	*	*	373	375	25.2	25.4
9	7-16	1102	58	23.9	23.0	8.2	8.4	8.0	6.1	365	327	24.7	22.0
10	7-23	1334	261	26.0	24.7	8.8	8.2	*	*	382	381	24.8	25.5
11	7-30	0	0	25.6	25.1	8.0	7.7	4.7	0.9	384	358	25.2	23.6
12	8-7	1421	551	25.4	25.2	7.8	*	2.4	2.1	366	354	24.0	23.3
13	8-13	3551	938	26.8	25.2	7.9	*	7.6	*	377	360	24.1	23.6
14	8-21	201	67	23.5	23.1	7.4	7.3	4.0	4.4	369	341	24.9	23.6
15	8-27	544	136	25.3	22.7	8.7	7.4	7.1	3.6	350	296	23.2	20.2
Seasonal Averages		644	140	22.4	21.5	8.3	8.1	7.3	4.3	372	366	24.0	23.6

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XVII

TOTAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-13 Head of the Bay

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1421	0	14.5	14.4	8.4	8.3	8.1	7.1	371	378	20.9	21.1
2	6-1	551	0	17.1	16.0	8.8	8.1	9.2	2.4	345	367	20.8	22.0
3	6-7	58	29	18.7	18.0	8.4	8.4	7.8	6.6	351	360	*	*
4	6-13	29	0	19.1	18.9	8.6	8.6	7.6	6.9	362	369	21.0	21.6
5	6-18	0	0	21.4	19.8	8.7	8.2	13.2	2.9	365	378	26.9	27.8
6	6-25	58	29	22.8	22.2	8.6	8.5	10.3	5.9	385	390	23.9	24.2
7	7-3	683	174	23.5	22.8	8.0	8.3	4.0	3.7	362	365	24.7	25.7
8	7-12	58	58	23.9	23.7	*	*	*	*	369	369	25.0	25.1
9	7-16	87	29	24.1	22.8	8.2	8.6	7.9	6.0	365	359	24.6	24.8
10	7-23	CON	1050	26.3	25.7	8.6	8.0	*	*	371	382	24.0	25.0
11	7-30	67	0	25.6	25.6	7.2	6.9	10.7	6.1	379	386	24.8	25.3
12	8-7	1914	841	25.4	25.8	8.0	*	3.0	2.8	362	377	23.7	24.7
13	8-13	3484	804	27.1	26.2	7.9	*	6.4	*	369	375	22.9	24.1
14	8-21	804	335	23.8	23.8	7.4	7.3	3.8	3.0	360	359	24.3	24.3
15	8-27	1224	272	26.3	23.5	8.9	7.3	8.6	2.9	339	342	22.0	23.7
Seasonal Averages		696	241	22.6	21.9	8.3	8.0	7.7	4.5	364	370	23.5	24.2

Key
T=Total
F=Fecal
ST=Surface Temperature
BT=Bottom Temperature
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XVIII

TOTAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS
FOR JAMAICA BAY
MAY 21 TO AUGUST 27, 1990
Site JB-14 Broad Channel

Week	Date	T	F	ST	SpH	SDO	SC	SS
1	5-22	1933	0	13.4	7.8	6.7	382	22.9
2	6-1	232	58	19.6	8.8	9.1	369	20.7
3	6-7	*	58	*	*	*	*	*
4	6-12	1073	0	21.5	8.4	6.7	382	22.5
5	6-18	145	29	20.5	8.4	8.7	194	10.1
6	6-25	116	58	24.2	8.8	10.1	405	26.4
7	7-3	928	145	23.3	8.5	3.9	410	25.7
8	7-12	0	29	25.6	9.1	10.6	411	23.8
9	7-16	TNTC	TNTC	*	*	*	*	*
10	7-23	1334	754	25.3	6.8	2.7	389	24.6
11	7-30	134	67	27.9	7.5	14.6	410	25.7
12	8-7	754	261	26.5	8.0	3.7	366	23.8
13	8-13	2278	1206	24.3	7.4	5.2	339	22.8
14	8-21	533	87	21.8	7.2	5.1	353	25.0
15	8-27	TNTC	1800	27.0	8.3	7.4	362	22.4
Seasonal Averages		788	325	23.1	8.1	7.3	367	22.8

Key
T=Total
F=Fecal
ST=Surface Temperature
SDO=Surface Dissolved Oxygen
SC=Surface Conductivity
SS=Surface Salinity
*=Missing Data
CON=Confluent
TNTC=Too Numerous To Count

Table XX

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS FOR MARINE PARK
MAY 21 TO AUGUST 27,1990
Site MP-1

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	1044	0	12.6	12.6	8.3	8.2	9.0	8.7	401	403	21.7	22.0
2	6-1	174	0	15.8	15.1	8.3	8.2	8.4	6.1	384	398	23.4	24.4
3	6-7	87	0	17.7	15.6	8.5	8.3	10.7	6.5	397	413	*	*
4	6-12	522	145	15.9	14.9	8.3	8.2	8.4	7.3	421	442	26.0	27.4
5	6-18	0	0	20.7	16.9	8.6	8.1	12.5	4.1	420	418	26.3	28.7
6	6-25	0	29	21.0	19.9	8.3	8.4	10.5	6.8	431	437	27.2	27.2
7	7-3	348	145	22.4	21.6	8.2	8.2	4.8	4.7	415	417	26.3	26.7
8	7-12	580	116	20.5	20.1	*	*	*	*	375	375	27.2	27.4
9	7-16	3277	0	22.1	20.6	8.0	8.4	9.5	9.1	383	375	26.9	27.4
10	7-23	1421	29	23.6	23.0	8.1	7.7	8.3	*	400	396	27.4	27.4
11	7-30	0	0	24.7	24.7	7.1	7.1	5.7	5.7	409	408	27.4	27.3
12	8-7	493	116	24.9	24.4	8.0	*	4.0	3.9	403	399	26.9	27.0
13	8-13	0	67	25.2	25.2	7.8	*	6.1	*	402	403	26.6	26.7
14	8-22	268	134	22.2	21.2	8.0	8.1	7.2	5.6	357	353	25.3	25.6
15	8-27	2040	561	23.3	22.7	7.7	7.6	6.2	5.4	378	368	25.9	25.8
Seasonal Average		684	89	20.8	19.9	8.1	8.0	8.0	6.2	398	400	26.0	26.5

Key
T=Total
F-Fecal
ST=Surface Temperature
BT=Bottom Temperature
SpH=Surface pH
BpH=Bottom pH
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data

Table XXI

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETERS FOR MARINE PARK
MAY 21 TO AUGUST 27,1990
Site MP-2

Week	Date	T	F	ST	BT	SpH	BpH	SDO	BDO	SC	BC	SS	BS
1	5-22	145	0	13.4	12.4	8.4	8.2	11.0	8.5	395	404	21.4	22.0
2	6-1	58	0	15.6	15.8	8.3	8.1	8.7	6.6	386	382	23.4	24.4
3	6-7	145	29	18.6	15.9	8.5	8.3	10.9	6.3	393	397	*	*
4	6-12	203	29	16.0	14.7	8.3	8.3	7.9	7.2	421	434	26.0	27.3
5	6-18	0	0	21.0	18.0	8.5	8.2	12.2	4.7	419	399	26.2	26.7
6	6-25	29	0	21.6	20.3	8.5	8.5	11.2	7.1	431	434	27.3	27.3
7	7-3	203	116	22.7	22.5	8.2	8.2	4.8	4.7	417	420	26.0	27.5
8	7-12	29	0	21.3	19.8	8.3	*	*	*	379	377	27.2	27.8
9	7-16	3355	87	22.3	21.4	8.2	8.0	9.3	9.8	385	379	26.9	27.0
10	7-23	1711	464	23.4	23.3	7.9	7.8	8.1	6.5	399	399	27.2	27.4
11	7-30	0	0	24.9	24.8	7.1	7.1	5.1	3.5	411	404	24.7	26.9
12	8-7	116	29	24.9	24.2	8.2	*	4.2	4.0	403	400	26.9	27.0
13	8-13	871	0	26.0	25.2	7.9	*	6.1	*	409	403	26.8	26.7
14	8-22	134	67	21.6	21.0	7.8	8.2	7.4	4.2	360	350	25.9	25.5
15	8-27	1564	612	23.1	22.8	7.8	7.4	6.8	4.2	376	370	25.9	25.8
Seasonal Average		571	96	21.1	20.1	8.1	7.2	8.1	5.9	399	373	25.8	26.4

Key
T=Total
F-Fecal
ST=Surface Temperature
BT=Bottom Temperature
SpH=Surface pH
BpH=Bottom pH
SDO=Surface Dissolved Oxygen
BDO=Bottom Dissolved Oxygen
SC=Surface Conductivity
BC=Bottom Conductivity
SS=Surface Salinity
BS=Bottom Salinity
*=Missing Data

Table XXII

TOTAL AND FECAL COLIFORM DENSITIES
AND WATER QUALITY PARAMETRS FOR MARINE PARK
MAY 21 TO AUGUST 27,1990
Site MP-3

Week	Date	T	F	ST	SpH	SDO	SC	SS
1	5-22	261	0	14.7	7.5	5.6	389	22.6
2	6-1	174	0	22.4	8.2	5.4	382	22.8
3	6-7	0	0	21.4	8.5	8.7	386	*
4	6-12	0	0	20.0	8.6	6.7	415	23.6
5	6-21	609	0	22.6	9.1	15.4	396	23.9
6	6-26	116	58	25.1	8.6	8.1	424	25.6
7	7-3	0	0	22.4	9.3	3.9	411	26.5
8	7-12	29	145	27.9	9.4	16.6	408	25.3
9	7-16	29	0	*	*	*	*	*
10	7-26	87	0	24.2	6.6	2.1	419	25.6
11	8-1	0	0	29.6	8.2	9.0	425	26.0
12	8-7	CON	CON	23.0	8.3	*	165	10.7
13	8-13	67	67	27.6	8.0	6.7	413	26.5
14	8-20	0	0	22.7	7.4	3.4	358	24.5
15	8-27	136	68	24.2	8.4	5.1	378	25.2
Seasonal Average		108	24	23.4	8.3	7.4	384	23.8

Key
T=Total
F=Fecal
ST=Surface Temperature
SpH=Surface pH
SDO=Surface Dissolved Oxygen
SC=Surface Conductivity
SS=Surface Salinity
CON=Confluent
*=Missing Data

Table XXIII

TOTAL AND FECAL COLIFORM DENSITIES
FOR STATEN ISLAND
MAY 21 TO AUGUST 27, 1990

Week	Date	SB2		MB3		NDB4		OB5		GK6		CP7		GKM8
		T	F	T	F	T	F	T	F	T	F	T	F	T
1	5-22	1073	0	232	0	725	0	313	0	433	0	522	0	313
2	5-29	435	174	174	0	377	0	29	0	406	261	145	58	29
	5-30					609	29			551	0			
3	6-5	145	0	116	0	29	0	58	0	145	0	58	0	116
4	6-11	870	0	29	0	0	0	29	0	0	29	29	0	232
5	6-19	1218	493	1392	203	377	58	232	0	174	29	116	116	29
6	6-25	116	58	232	0	203	174	29	29	290	0	145	58	87
7	7-2	1015	551	1595	580	58	29	29	58	58	116	116	29	0
	7-3	406	87	116	29									
8	7-9	58	0	0	0	174	0	29	0	29	261	0	0	0
9	7-17	0	0	29	0	116	0	0	0	3480	3509	0	0	377
10	7-23									232	203			
	7-24	1160	406	377	203	551	290	2546	87	145	58	58	87	406
11	7-31	174	29	116	0	0	58	29	29	0	0	29	0	87
	8-1									464	377			
12	8-6	1363	58	1189	232	1479	580	1421	435	145	232	0	0	725
13	8-14	464	145	522	203	435	232	290	203	145	29	203	0	232
14	8-20	348	87	348	232	145	232	377	87	290	58	733	0	6000
15	8-27	406	116	638	116	203	174	58	0	58	29	58	0	580
Seasonal Average		578	138	444	112	3431	116	342	58	391	288	147	23	614

Key
T=Total
F=Fecal
SB2=South Beach
MB3=Midland Beach
NDB4=New Dorp Beach
OB5=Oak Beach
GK6=Great Kills
CP7=Crooke's Point
GKM=Great Kills Marina
TNTC=Too Numerous to Count

Table XXIV

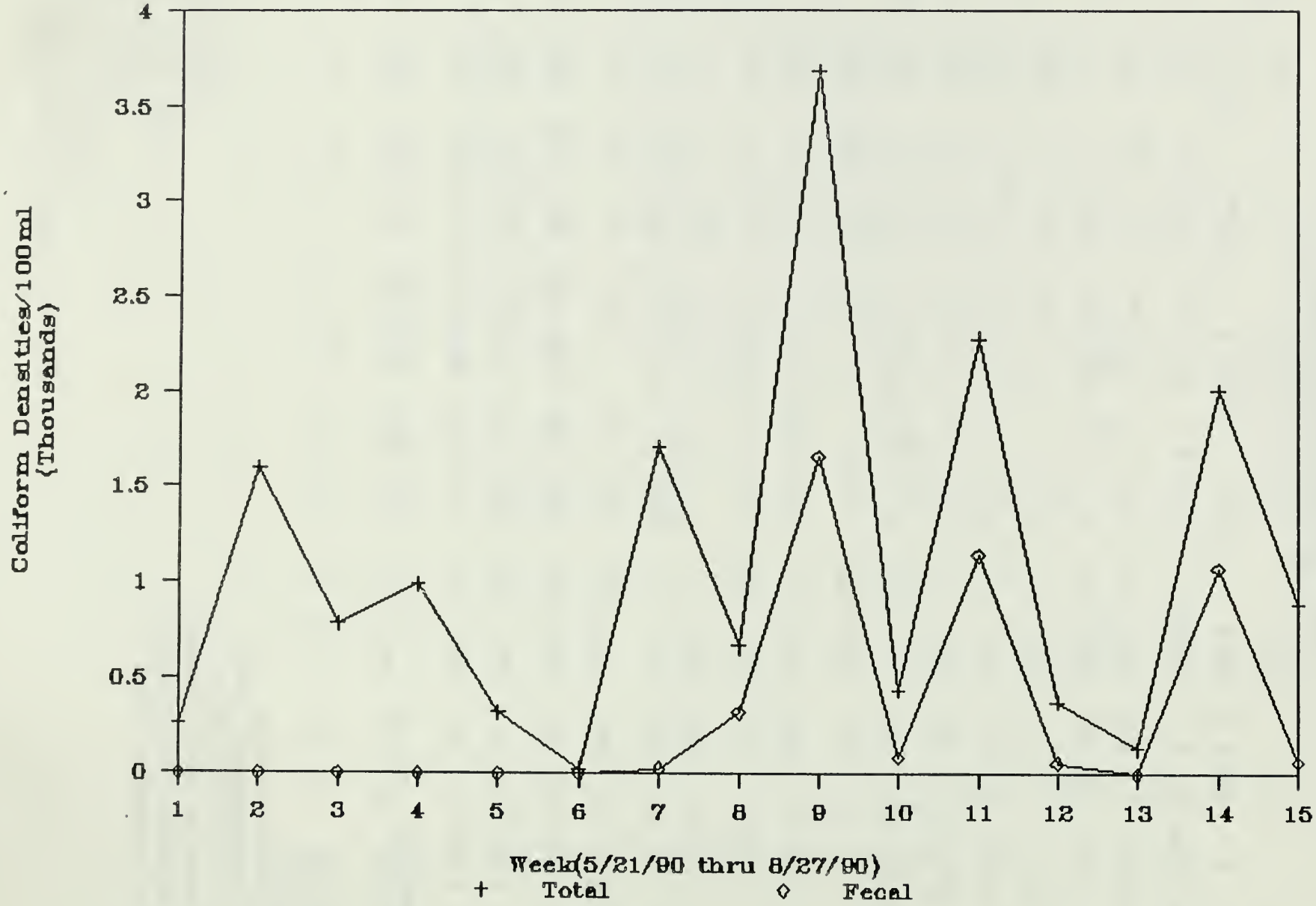
TOTAL AND FECAL COLIFORM DENSITIES
FOR SANDY HOOK
MAY 21 TO AUGUST 27,1990

		SH-1		SH-2		SH-3		SH-4		SH-5		SH-6	
Week	Date	T	F	T	F	T	F	T	F	T	F	T	F
1	5-23	0	0	0	0	87	0	493	0	29	29	0	0
2	5-30	145	29	116	29	29	0	29	0	145	0	58	0
3	6-6	0	0	58	0	29	0	87	0	0	0	58	87
4	6-13	29	0	29	0	29	0	0	0	0	0	29	0
5	6-20	232	58	87	0	0	0	0	0	0	0	29	0
6	6-27	58	29	0	0	0	29	58	87	29	0	29	29
7	7-4	58	0	725	58	0	0	29	0	87	29	0	0
8	7-11	87	29	87	0	116	116	0	0	29	0	29	0
9	7-19	0	0	0	29	29	0	29	0	29	0	87	87
10	7-25	29	0	58	0	0	0	29	0	29	0	0	0
11	8-1	29	29	0	0	CON	0	0	0	58	0	0	0
12	8-8	29	58	29	29	58	0	0	0	0	0	0	0
13	8-15	203	203	203	58	145	145	145	116	58	116	58	58
14	8-22	58	145	58	58	29	0	0	0	29	0	29	0
15	8-28	0	0	29	0	0	0	58	0	0	87	116	0
Seasonal Average		64	37	99	17	38	19	64	14	35	17	35	17

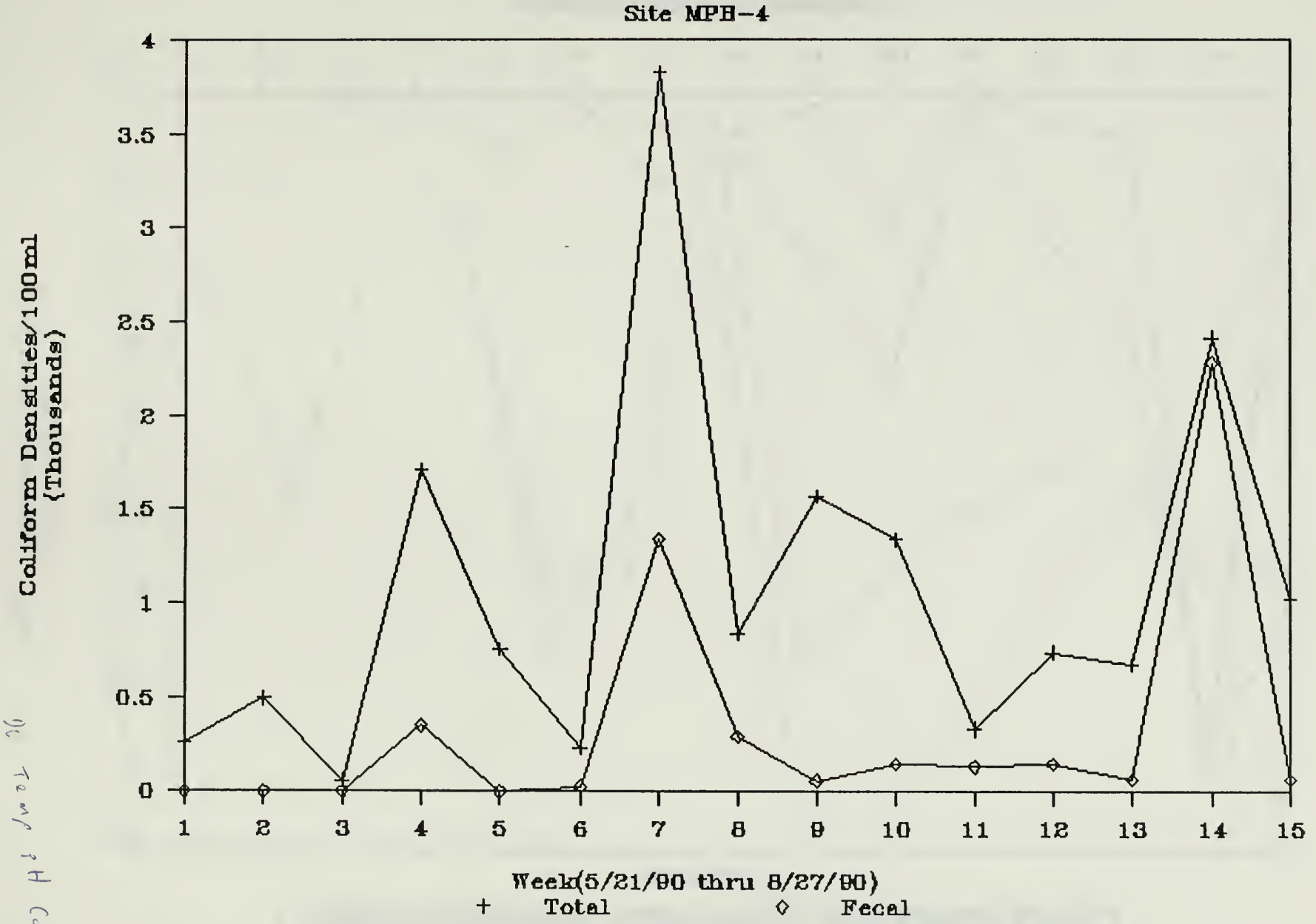
Key
T=Total
F=Fecal
SH-1=Plum Island
SH-2=Spermaceti Cove
SH-3=Parking Area D
SH-4=False Hook Channel
Sh-5=False Hook Channel
SH-6=Horseshoe Cove

Coliform Densities for Jamaica Bay

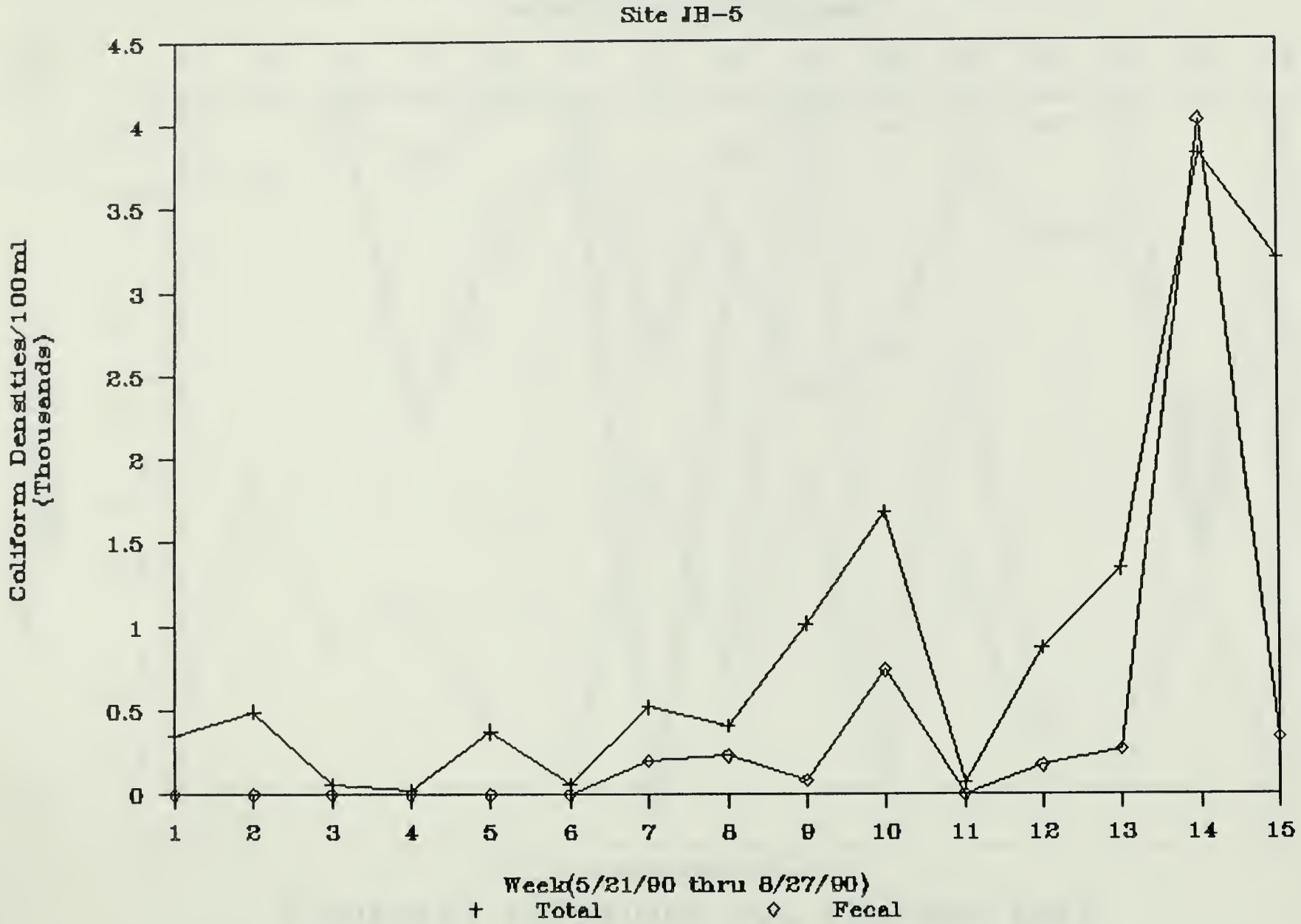
Site RI-3



Coliform Densities for Jamaica Bay

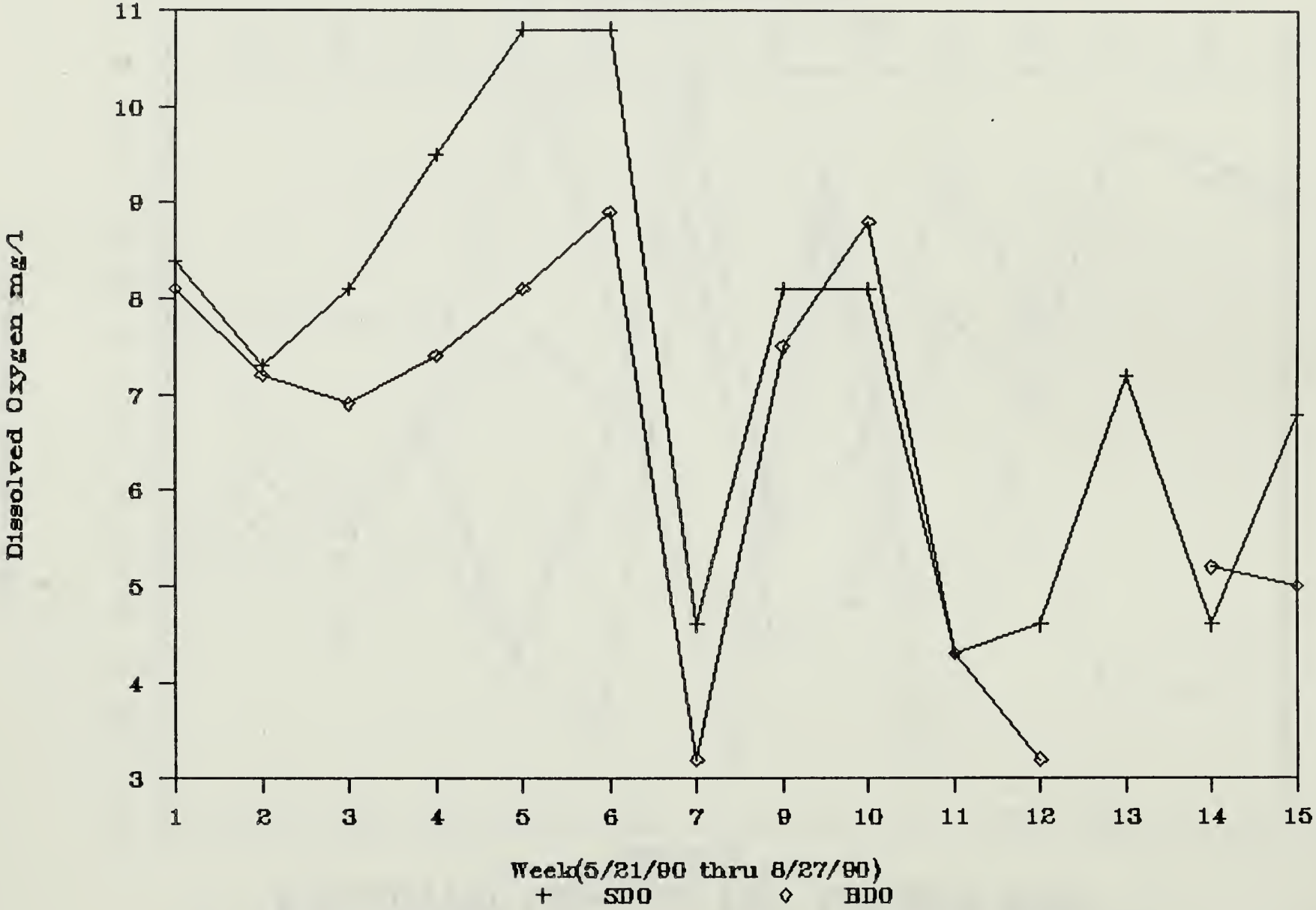


Coliform Densities for Jamaica Bay



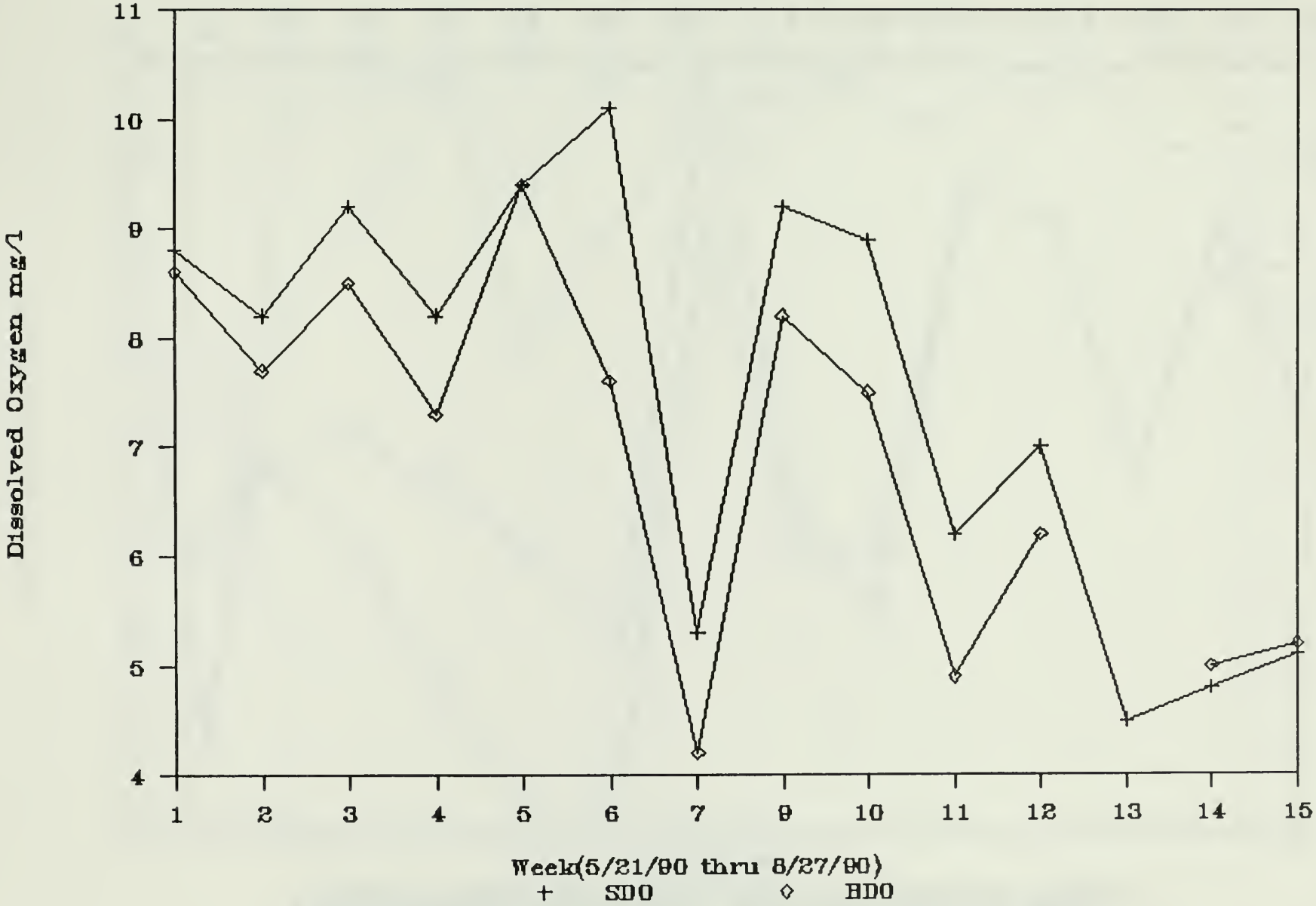
Dissolved Oxygen for Jamaica Bay

Site JB-6



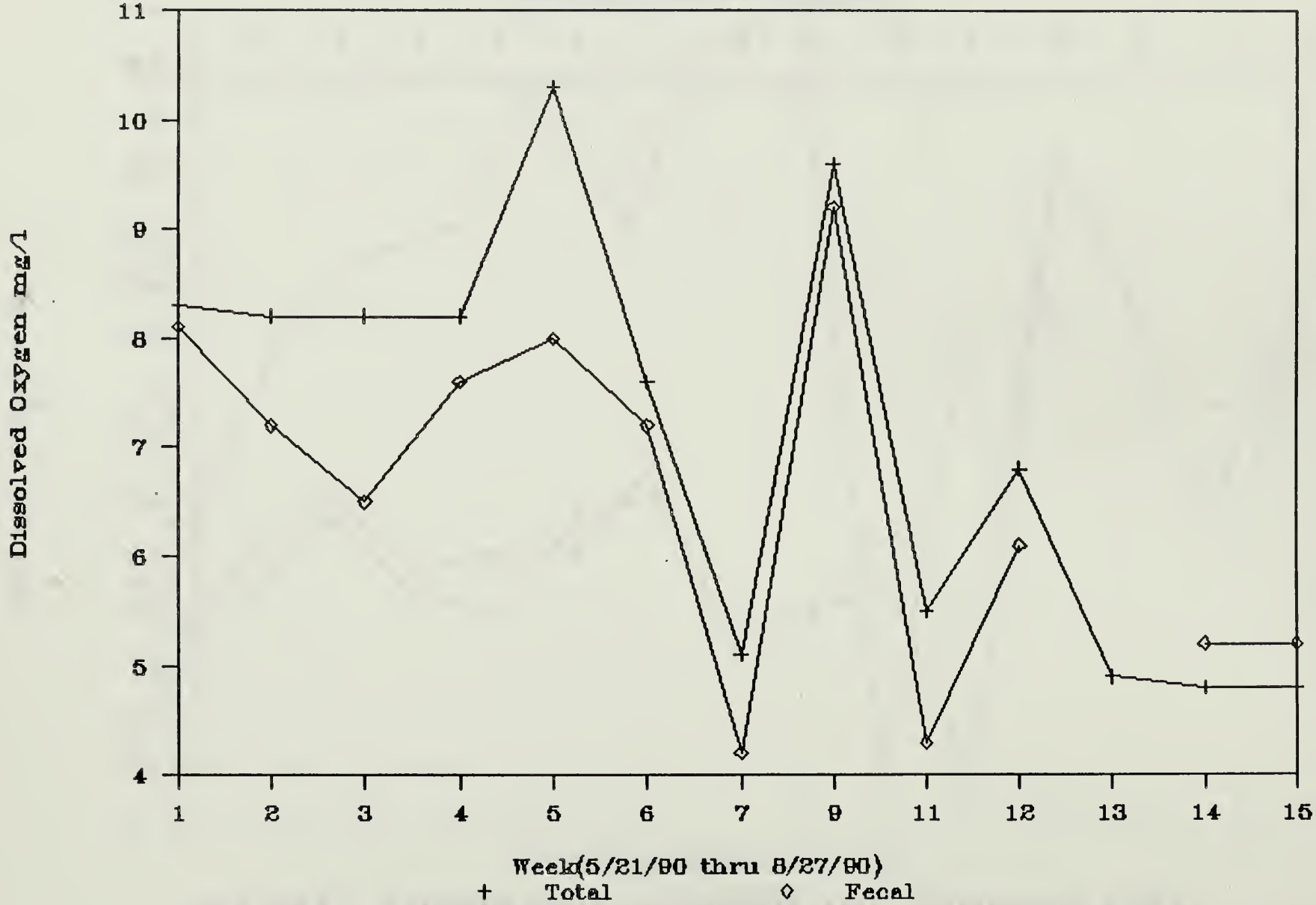
Dissolved Oxygen for Jamaica Bay

Site JB-5



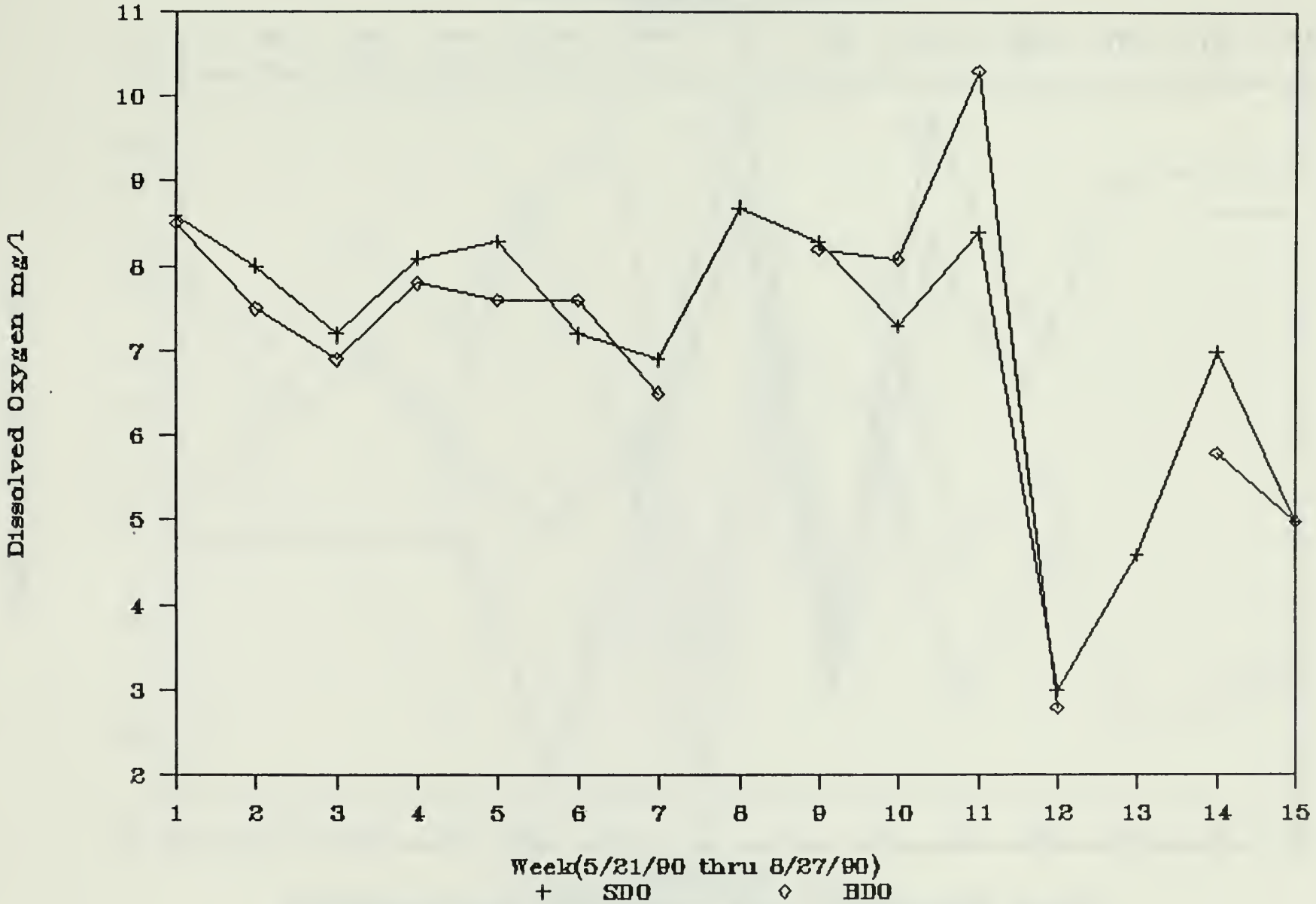
Dissolved Oxygen for Jamaica Bay

Site MPH-4



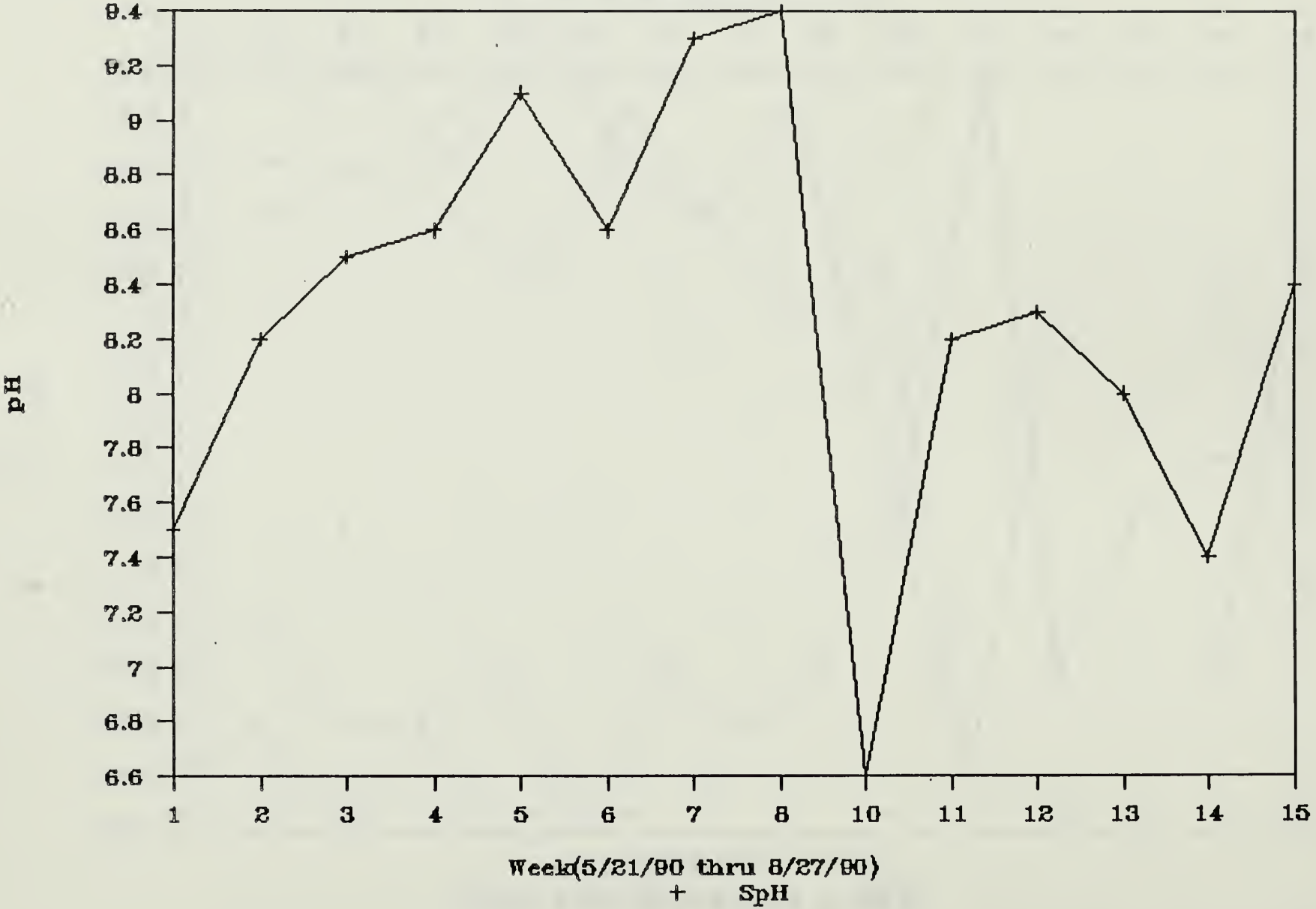
Weekly Dissolved Oxygen for Jamaica Bay

Site RI-3

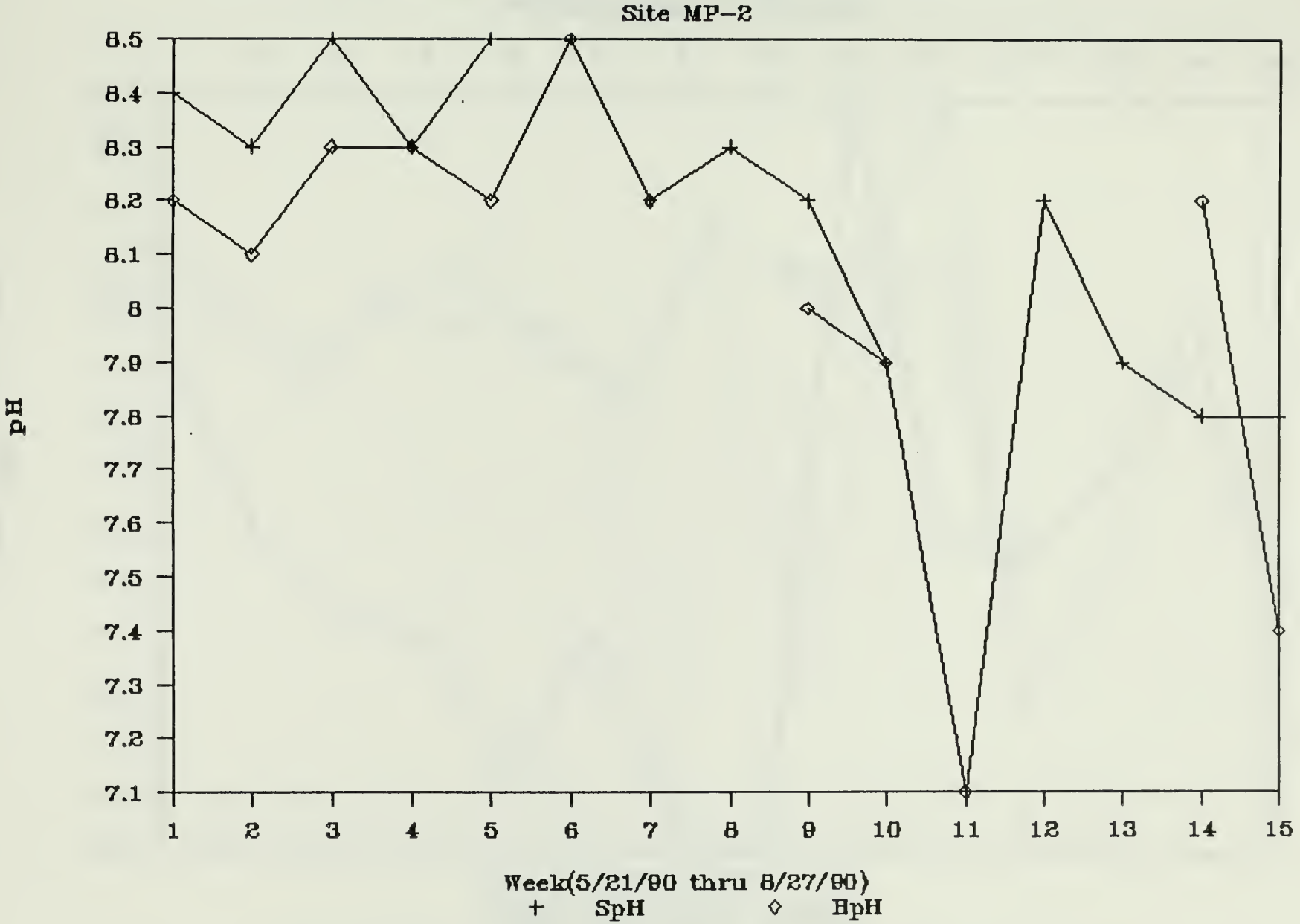


pH Marine Park

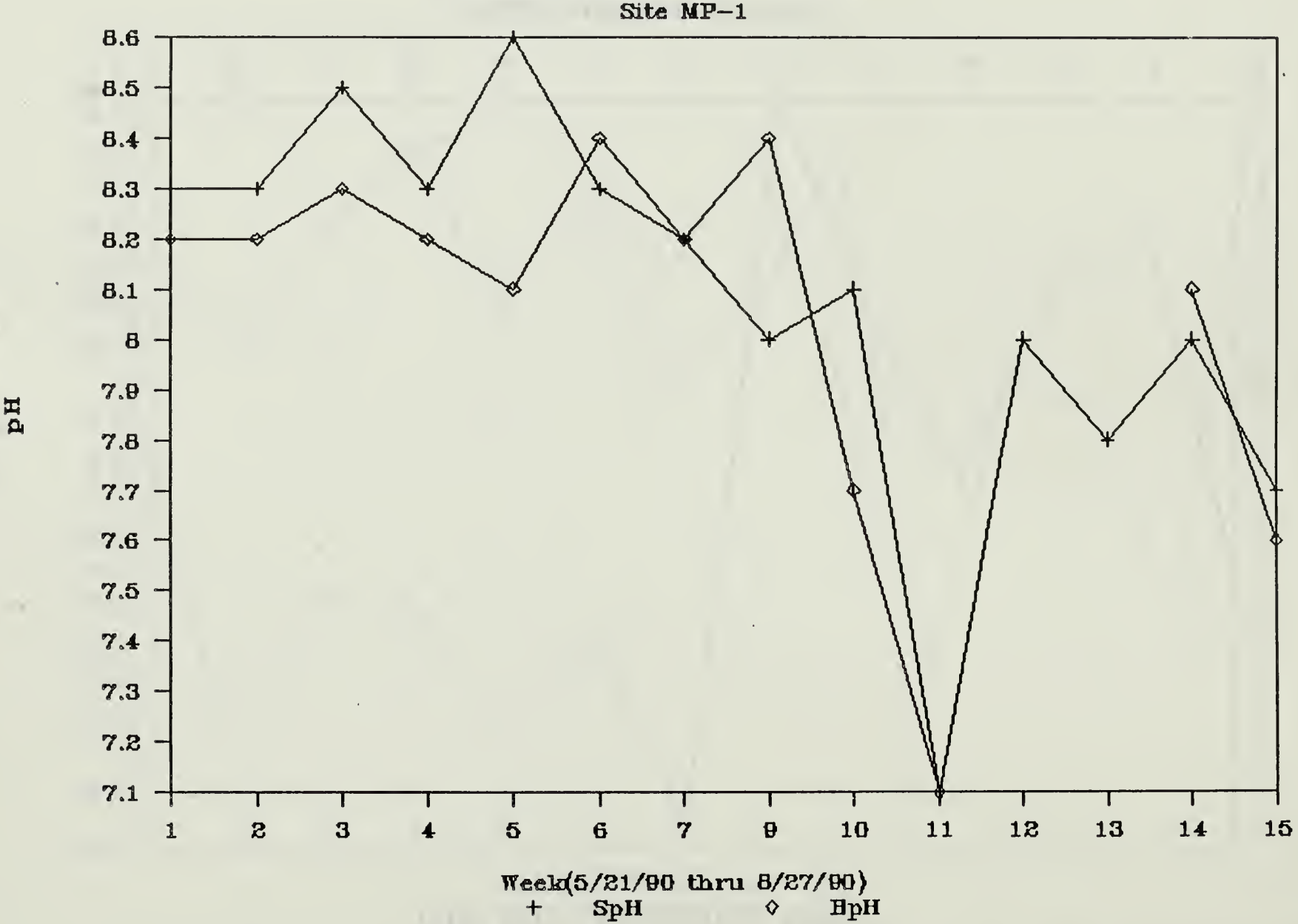
Site MP-3



pH for Marine Park

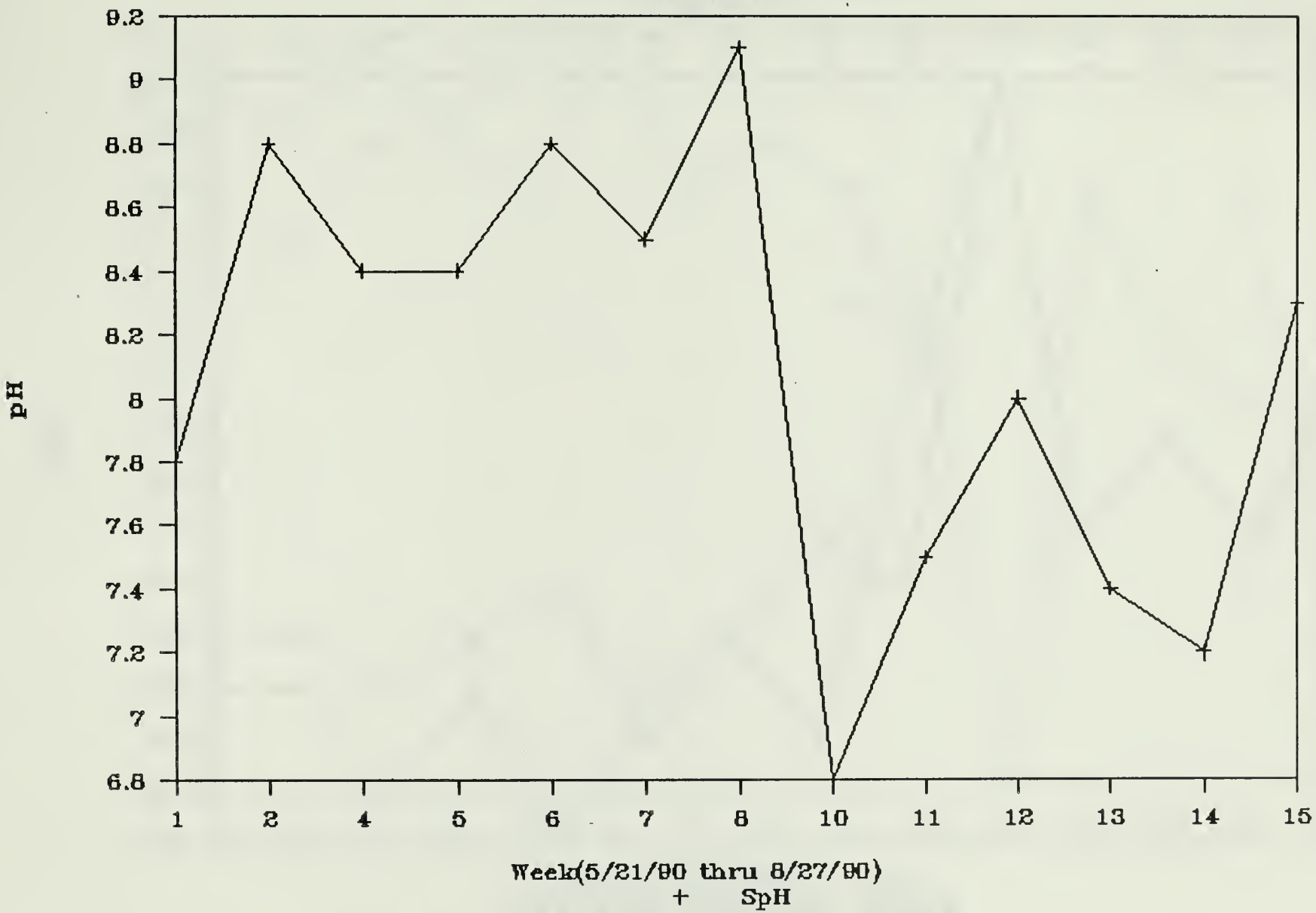


pH for Marine Park



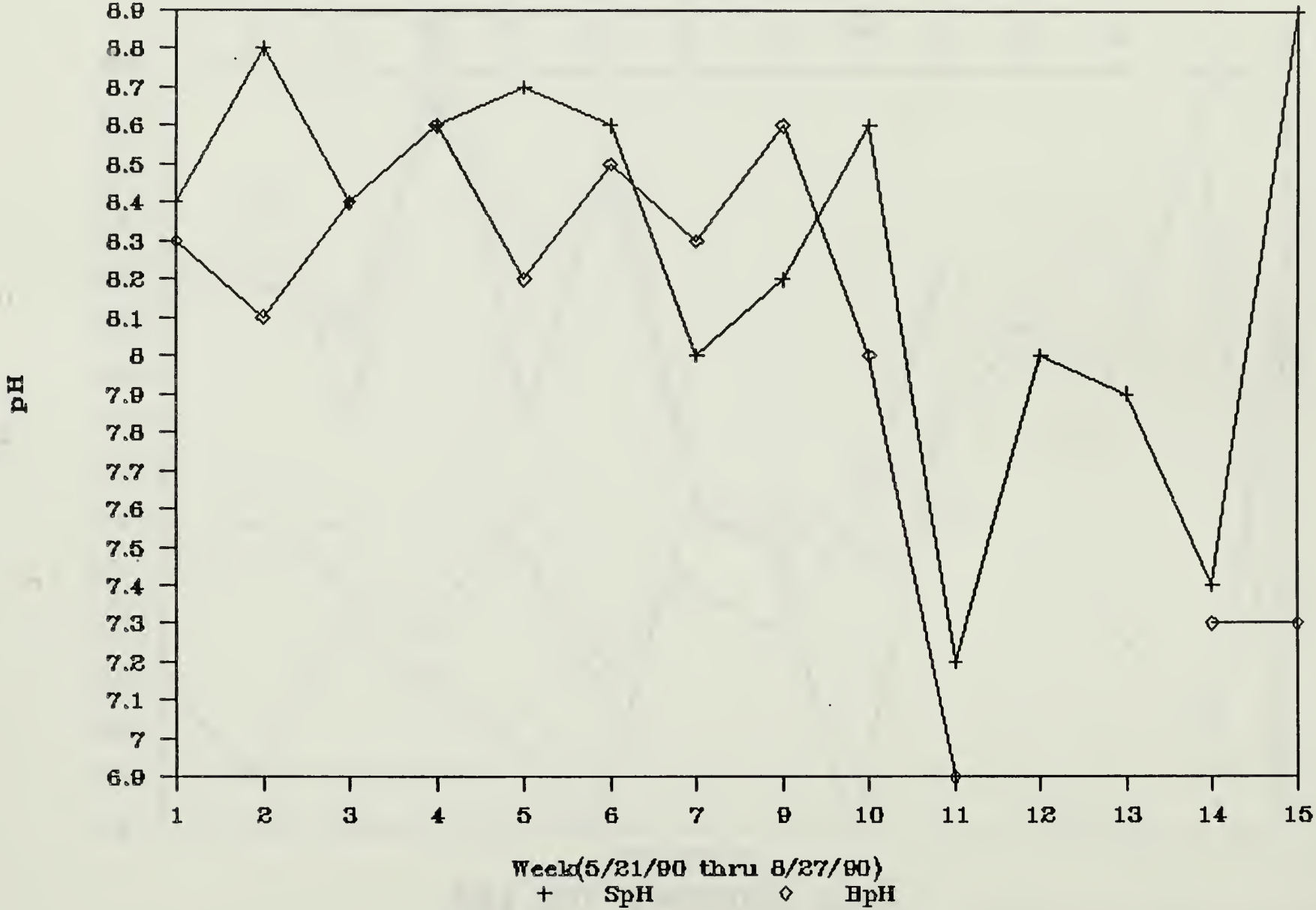
pH for Jamaica Bay

Site JB-14

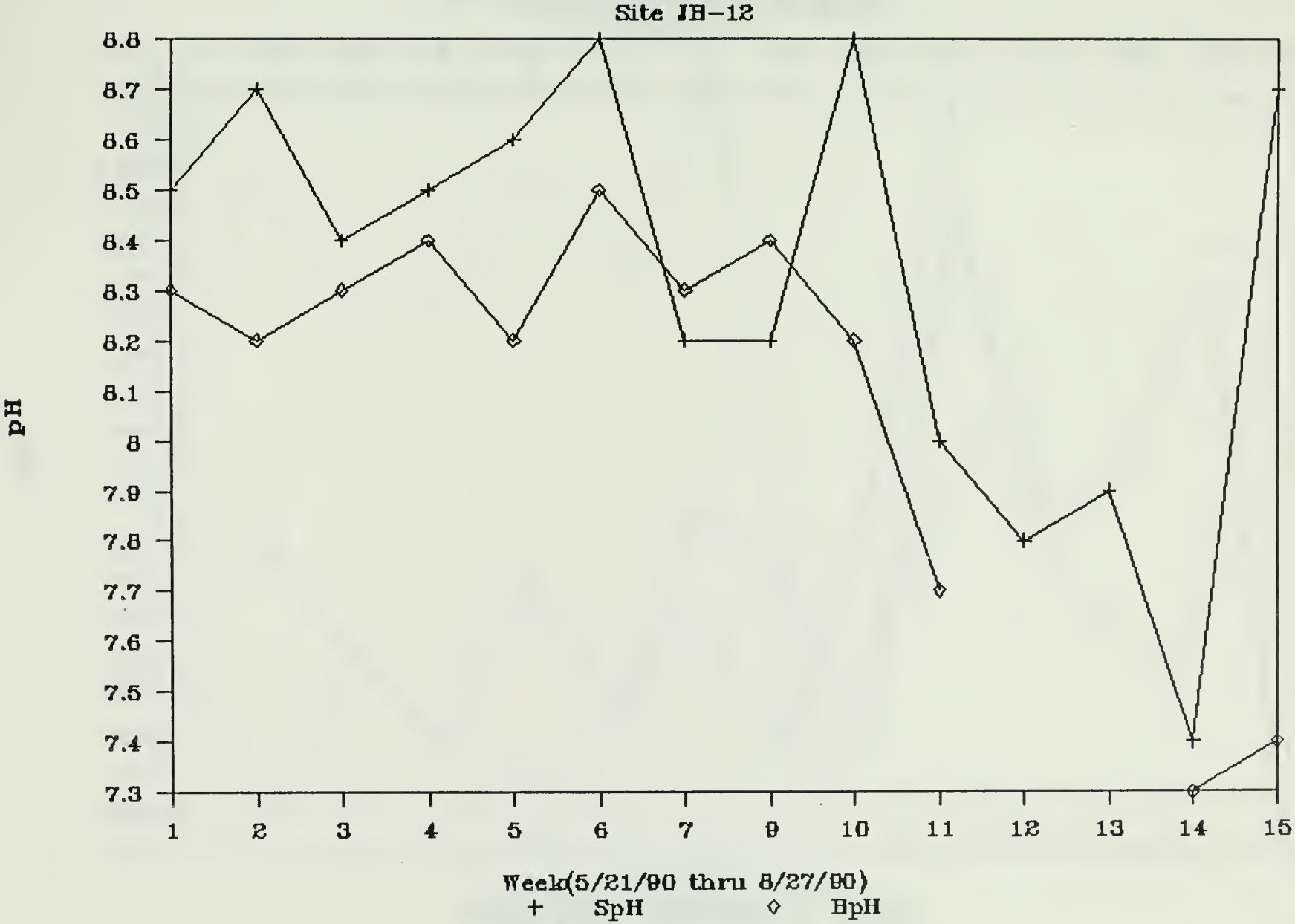


pH for Jamaica Bay

Site JB-13

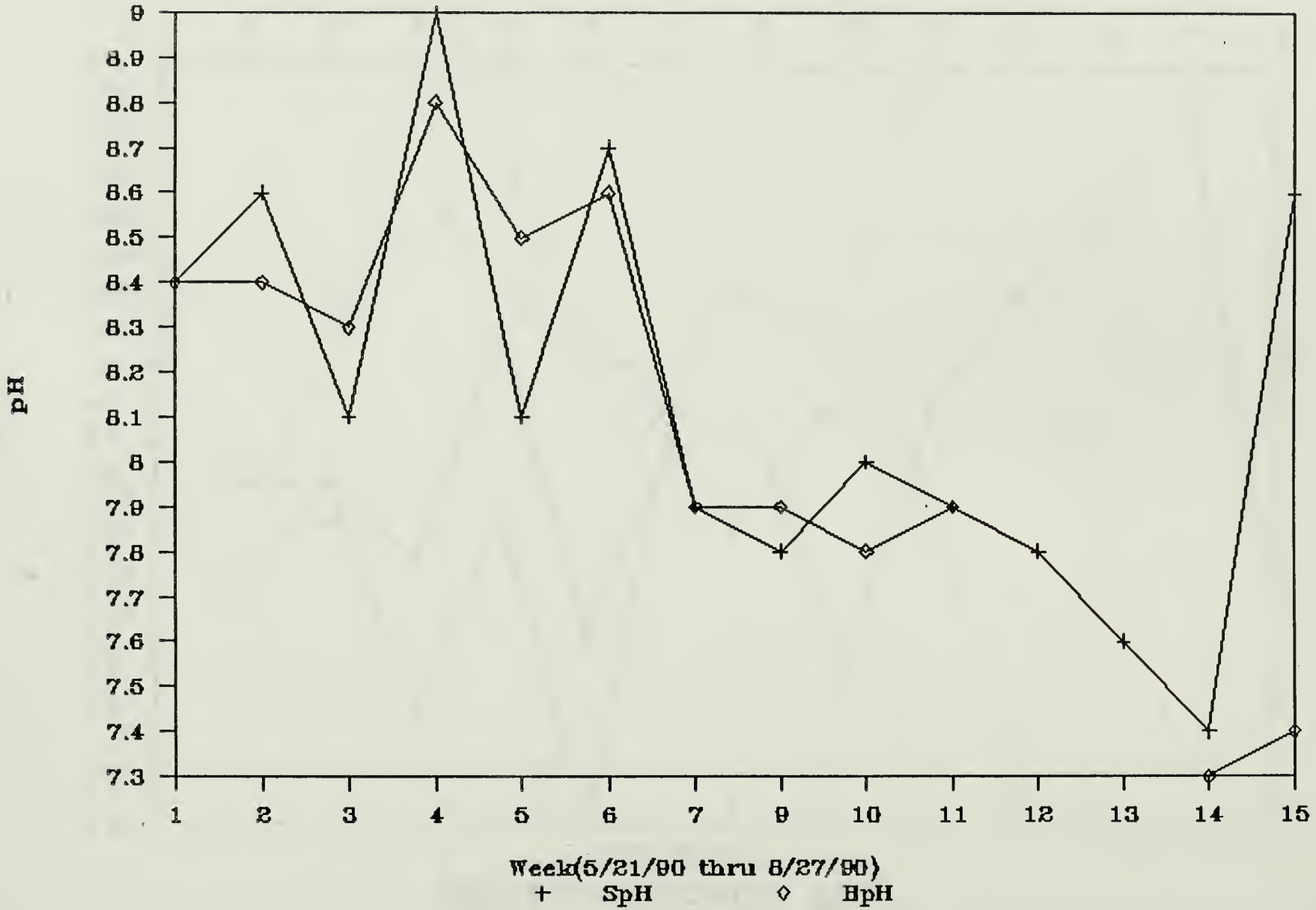


pH for Jamaica Bay

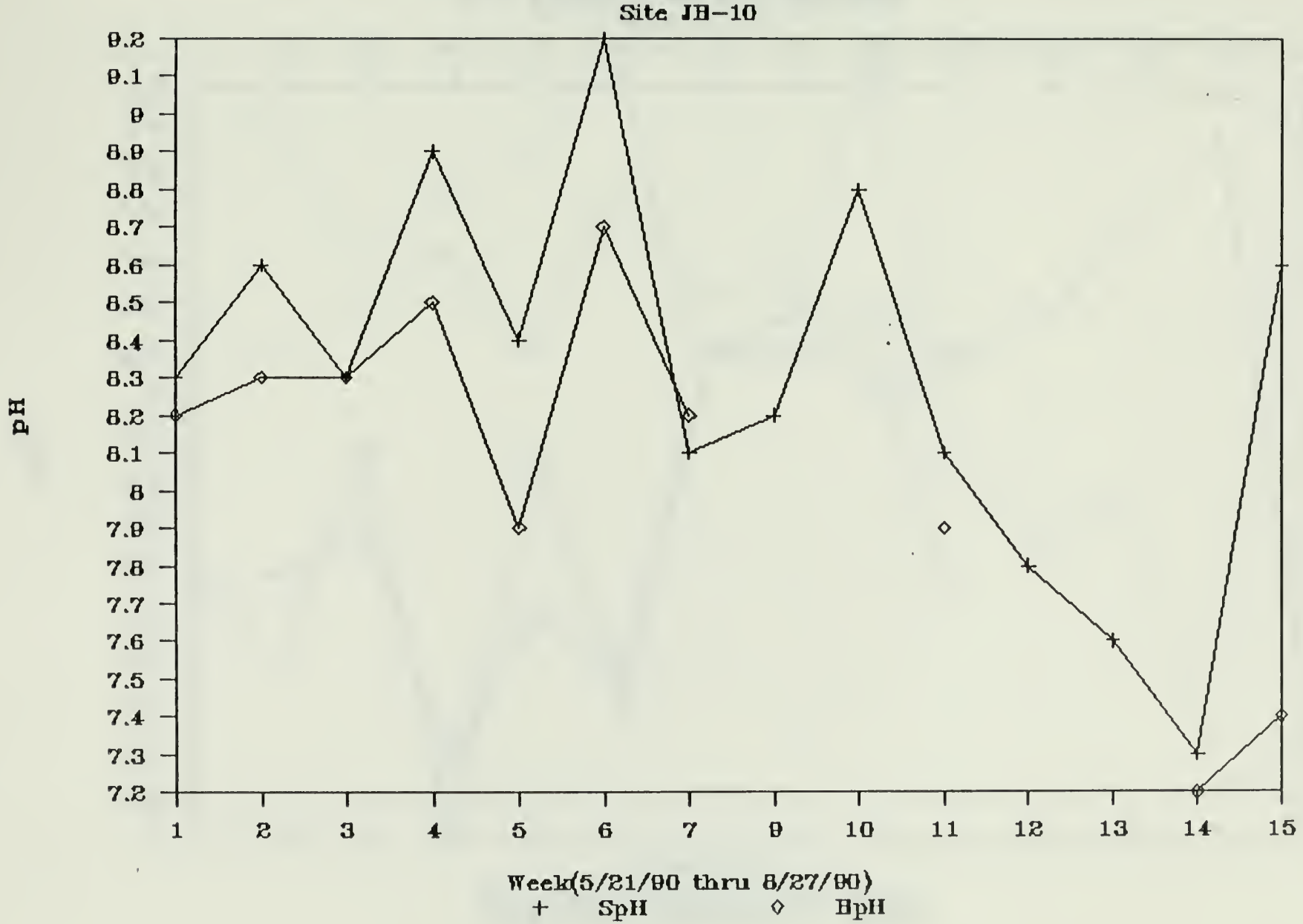


pH for Jamaica Bay

Site JB-11

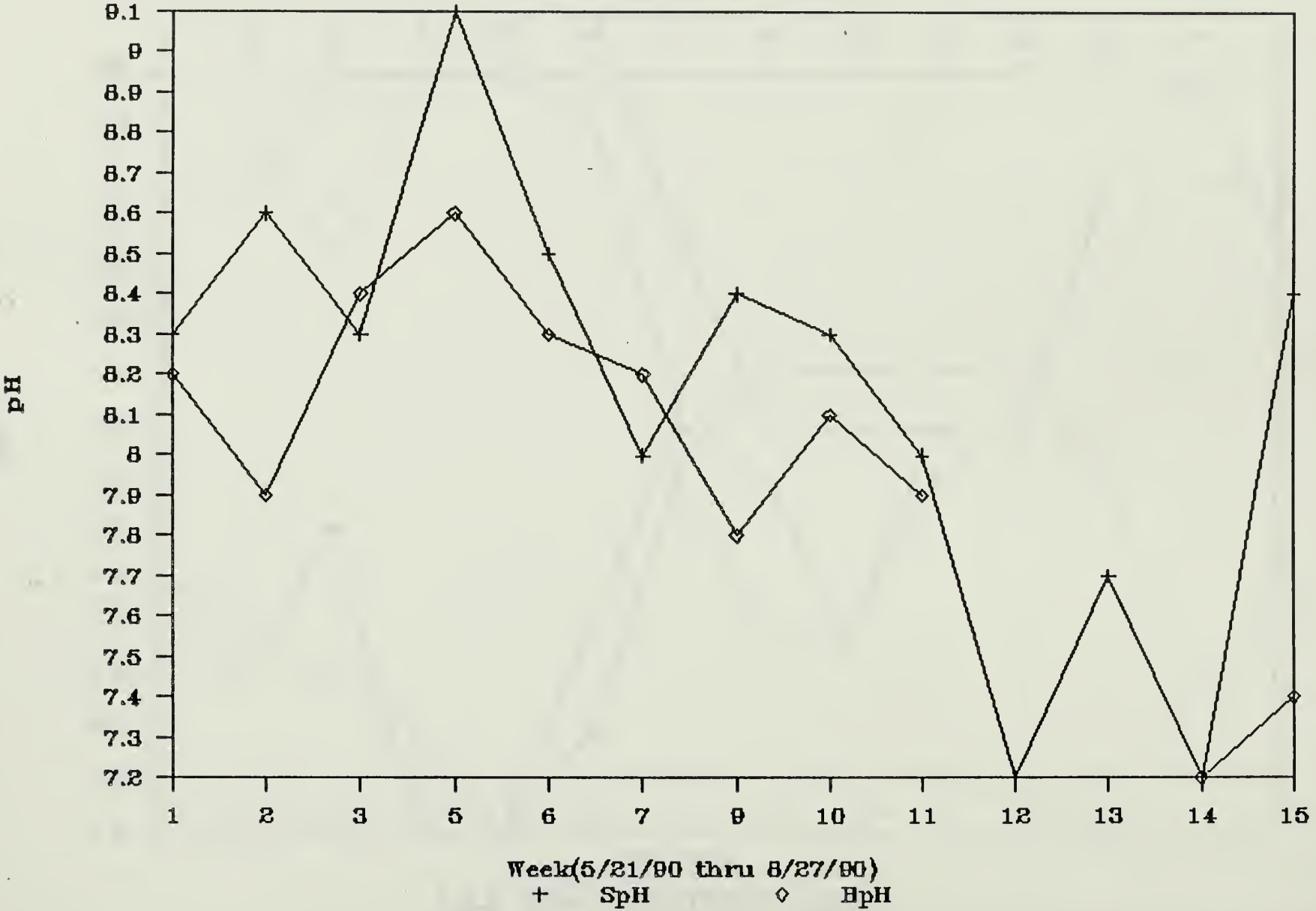


pH for Jamaica Bay



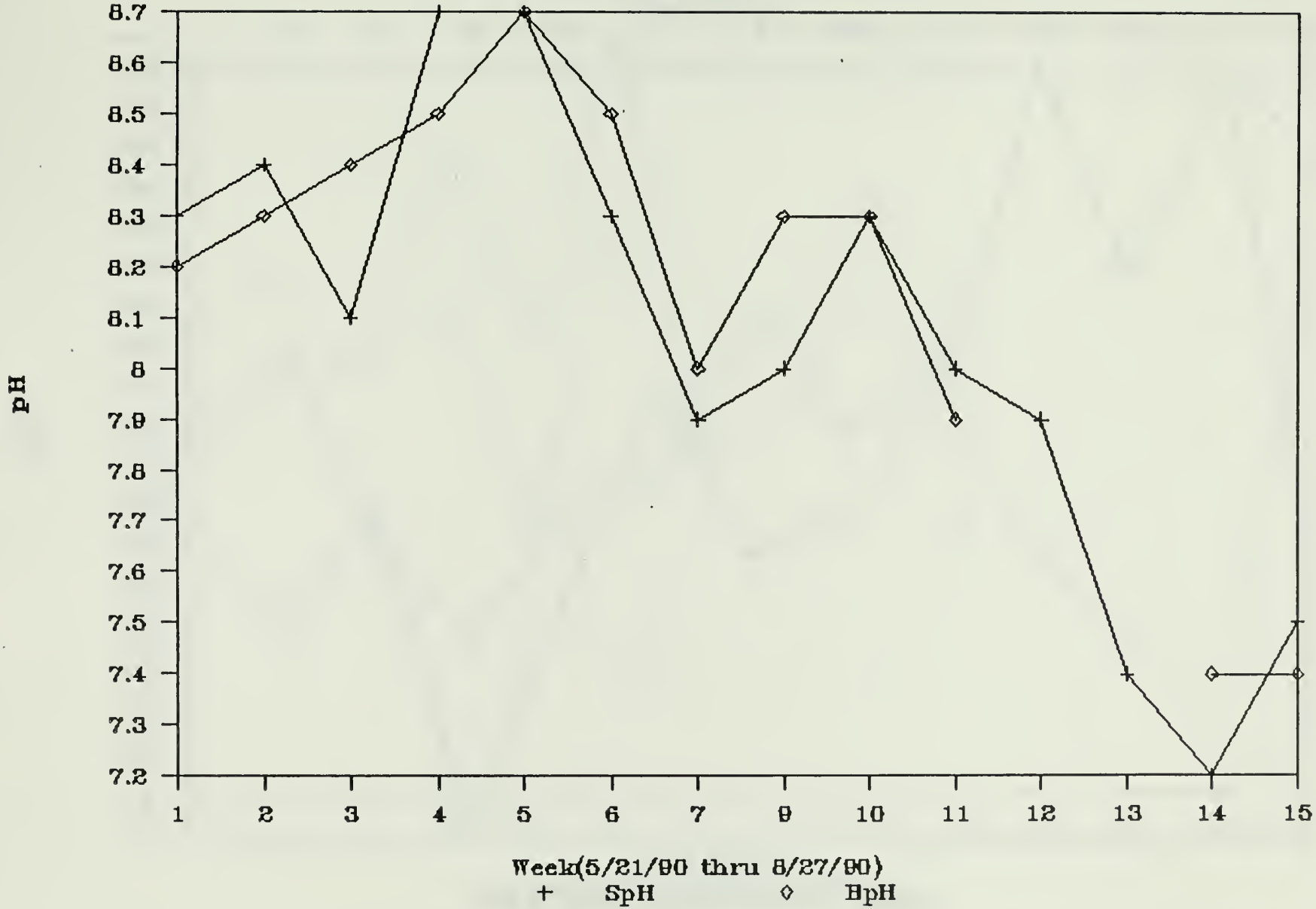
pH for Jamaica Bay

Site JB-9

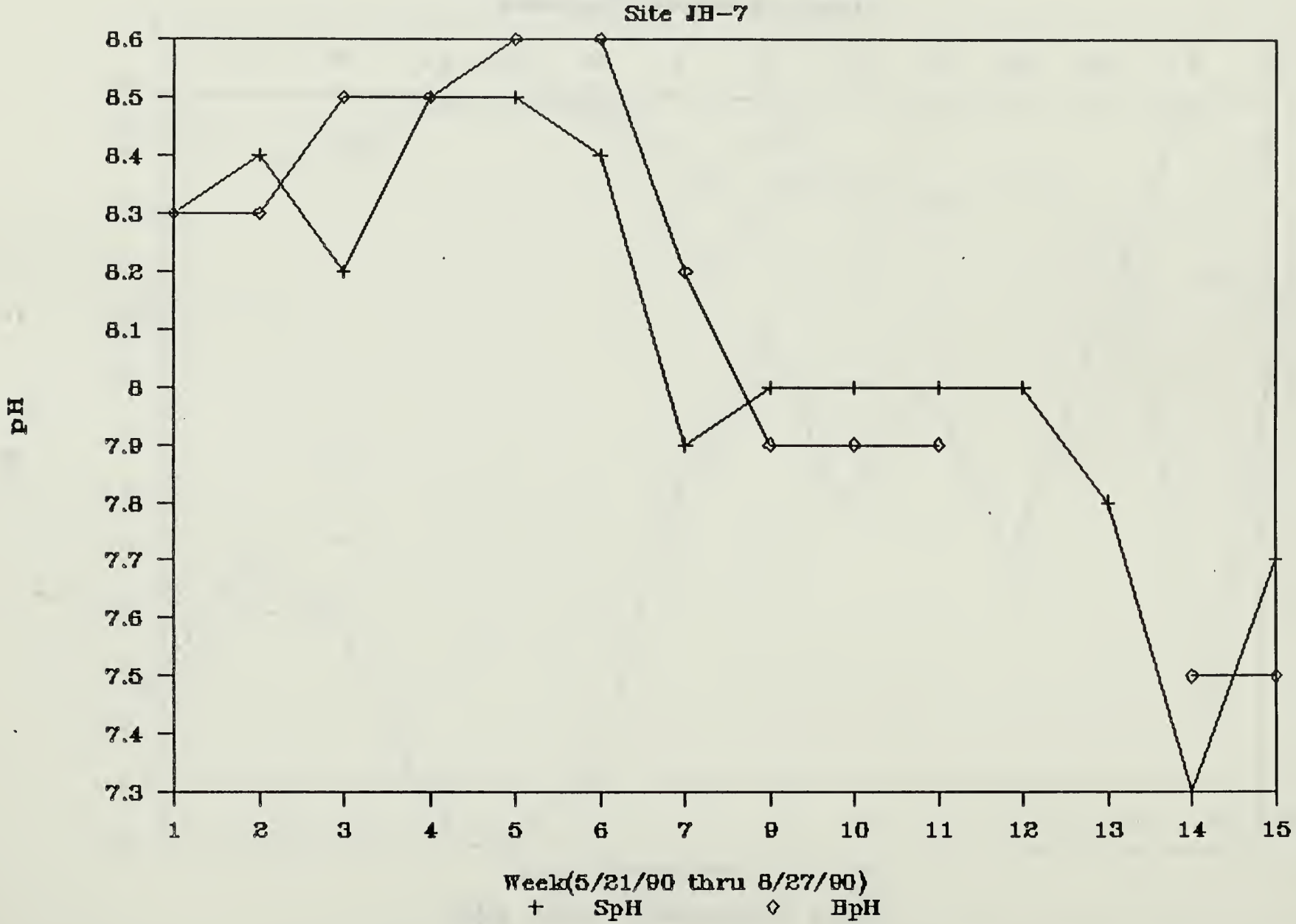


pH for Jamaica Bay

Site JB-8

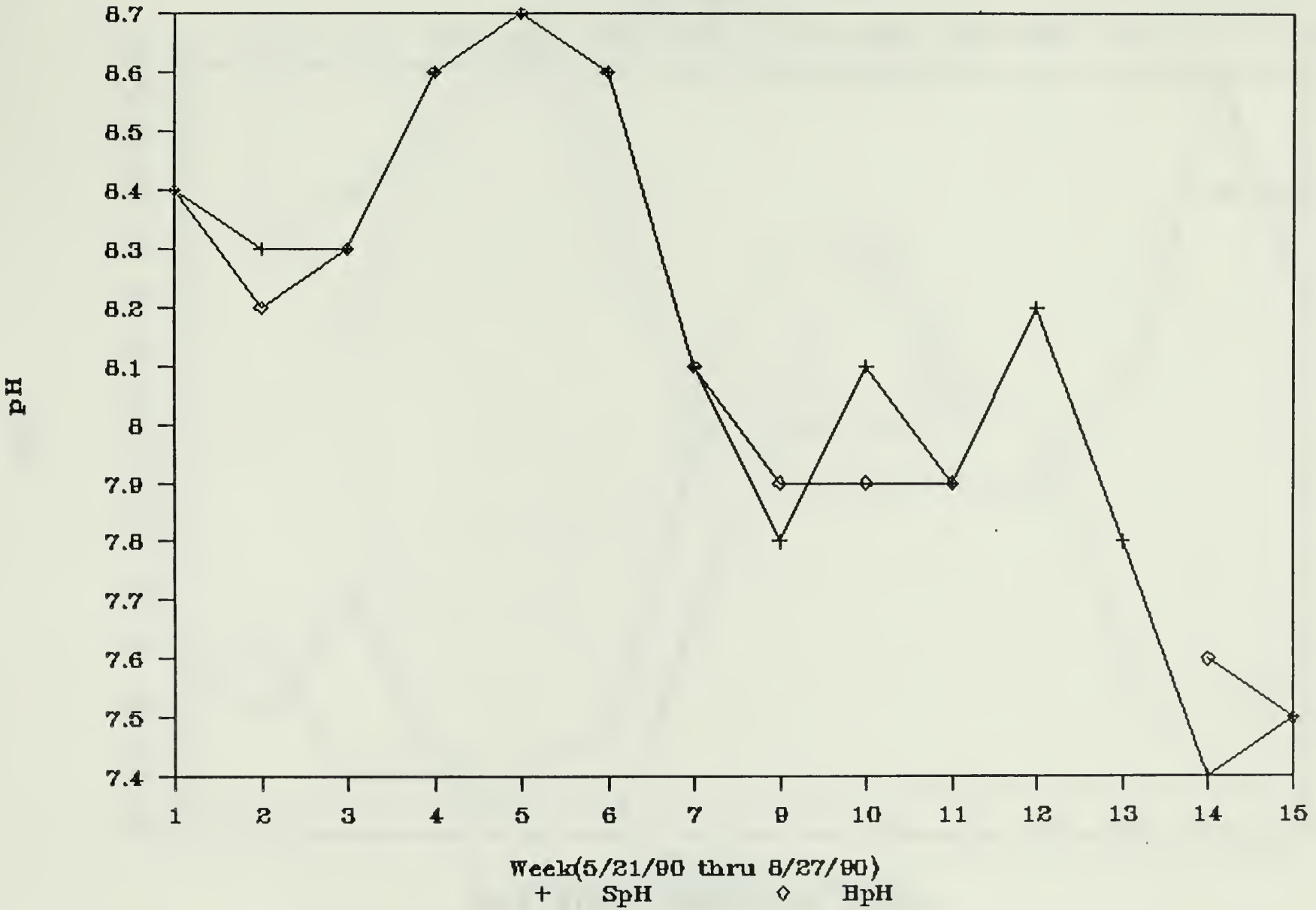


pH for Jamaica Bay

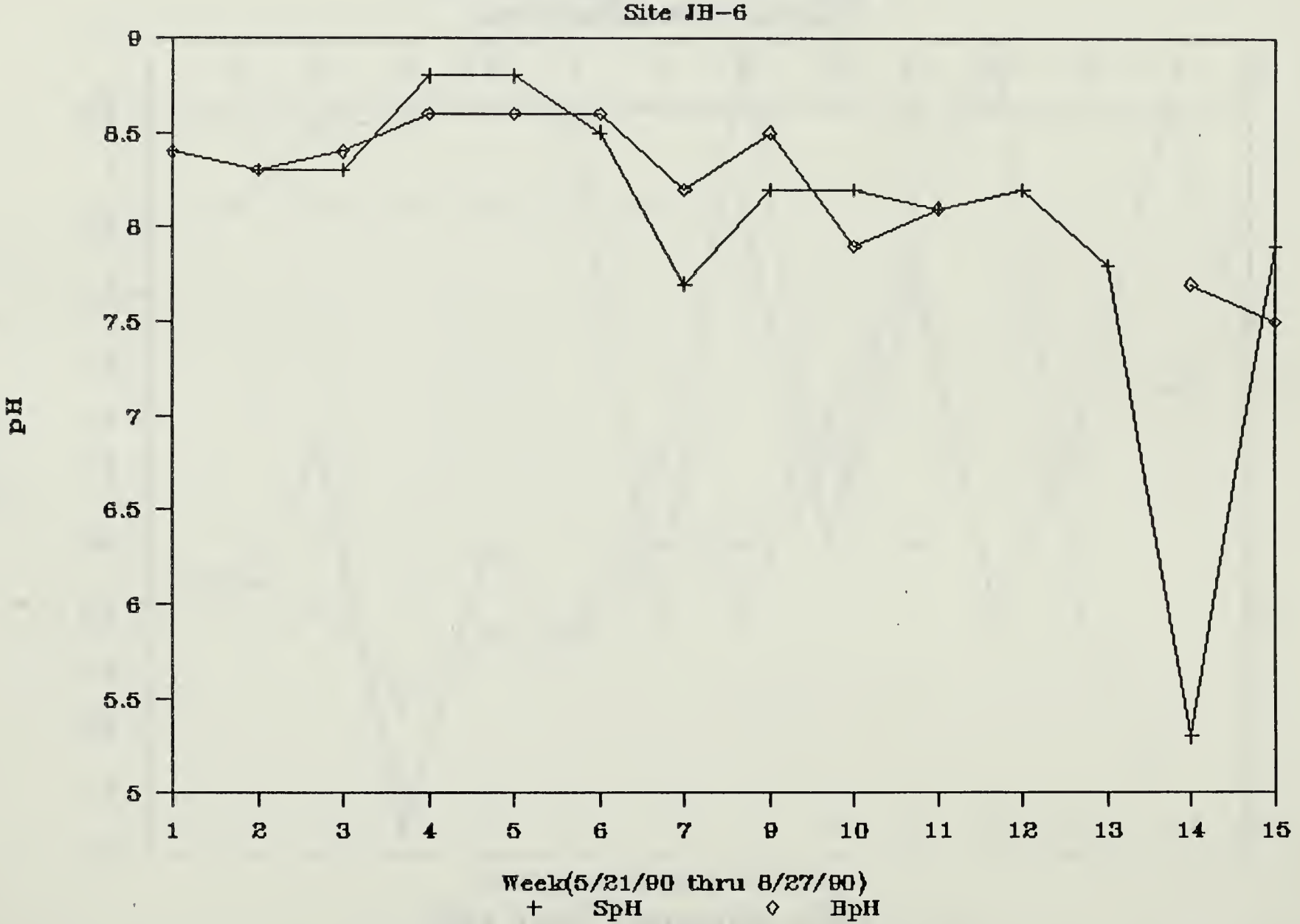


pH for Jamaica Bay

Site JB-6A

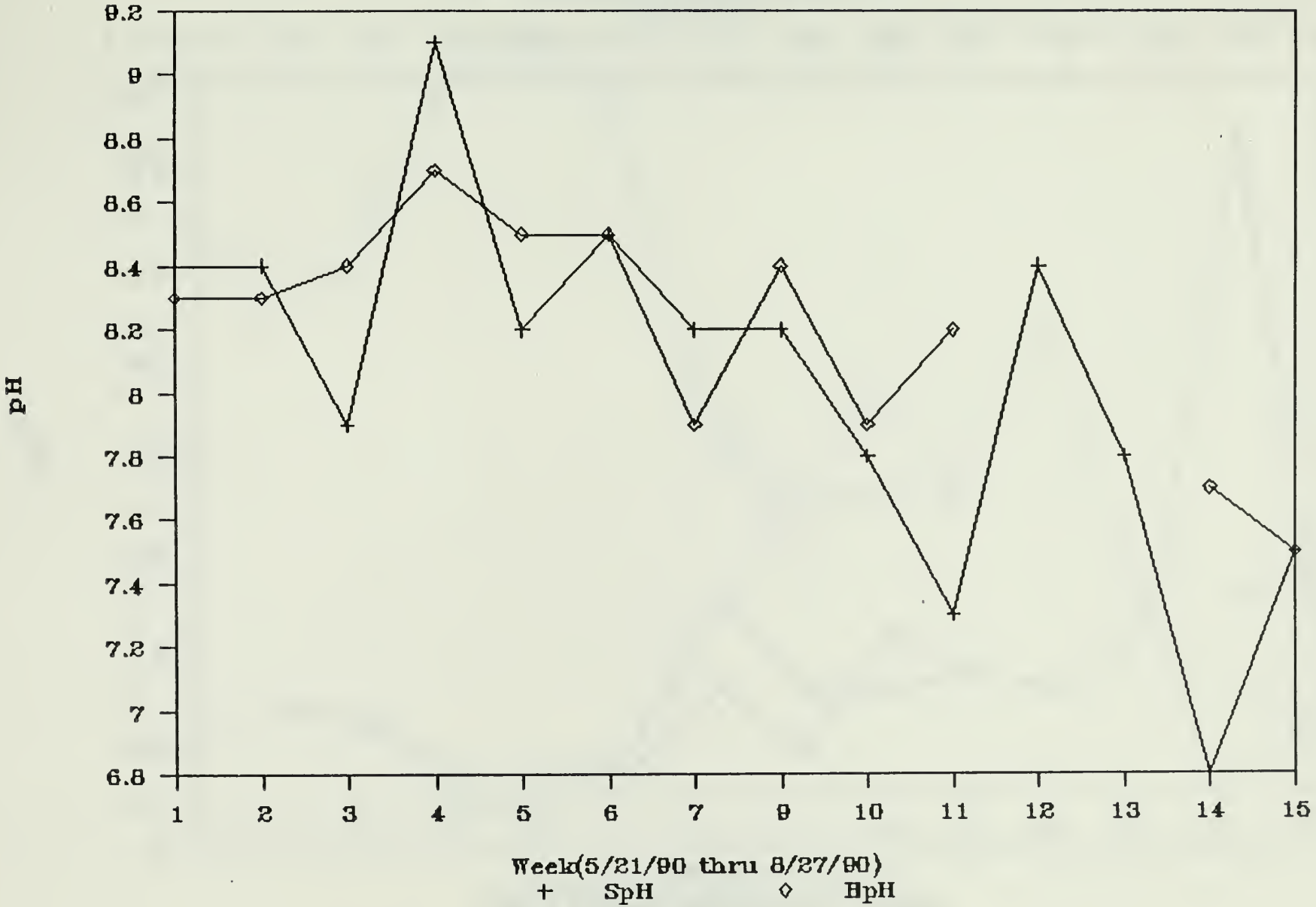


pH for Jamaica Bay

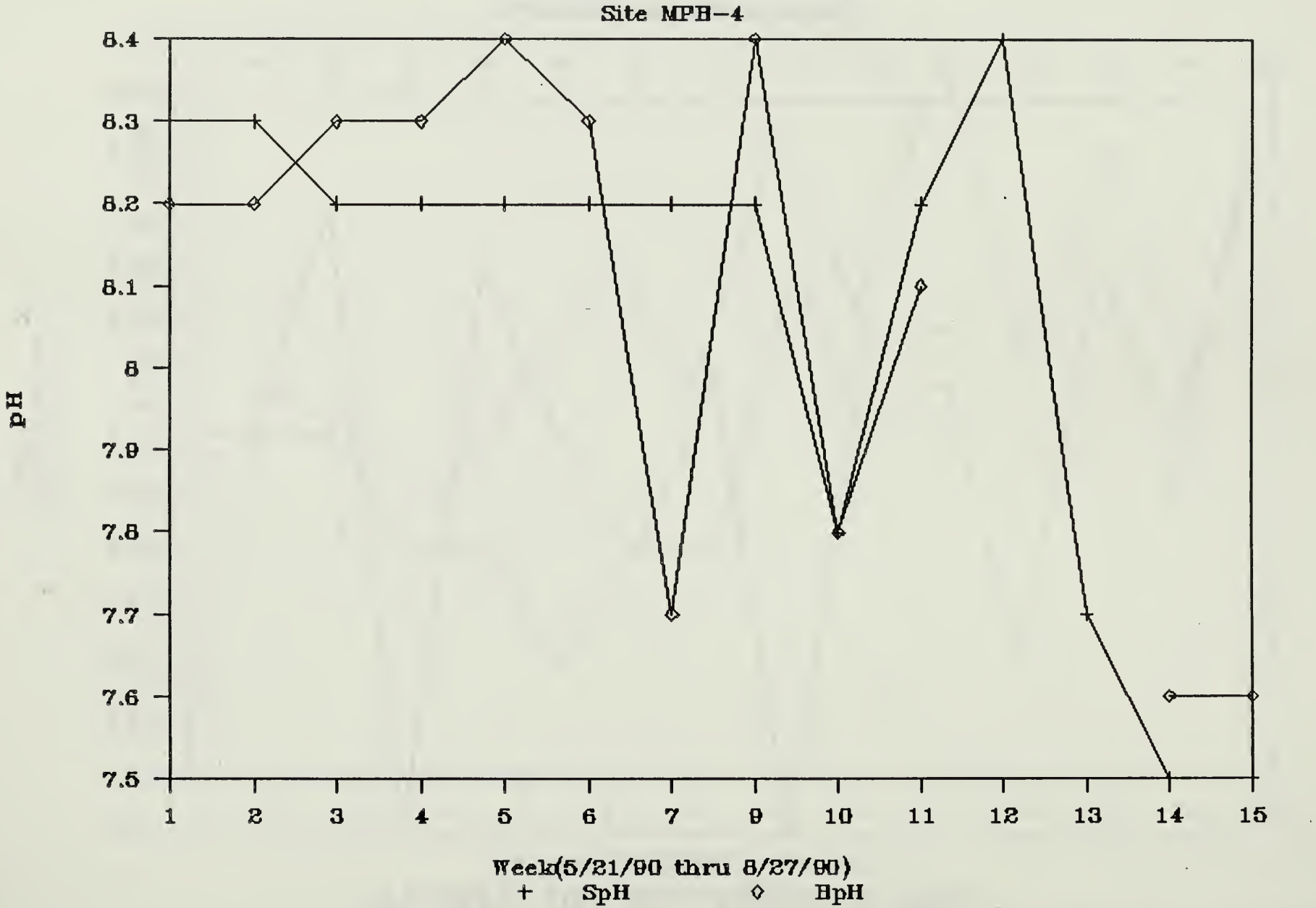


pH for Jamaica Bay

Site JB-5

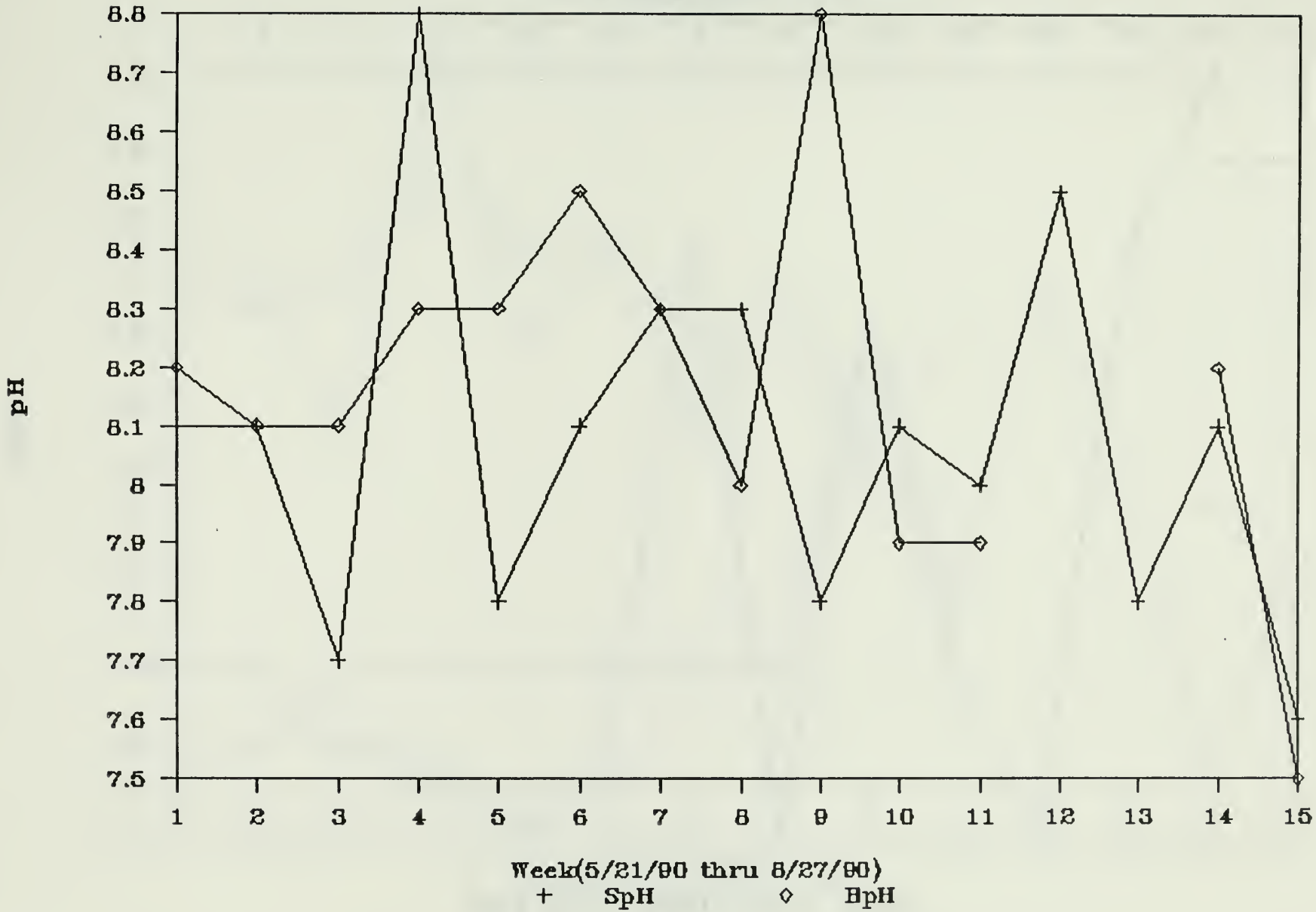


pH for Jamaica Bay



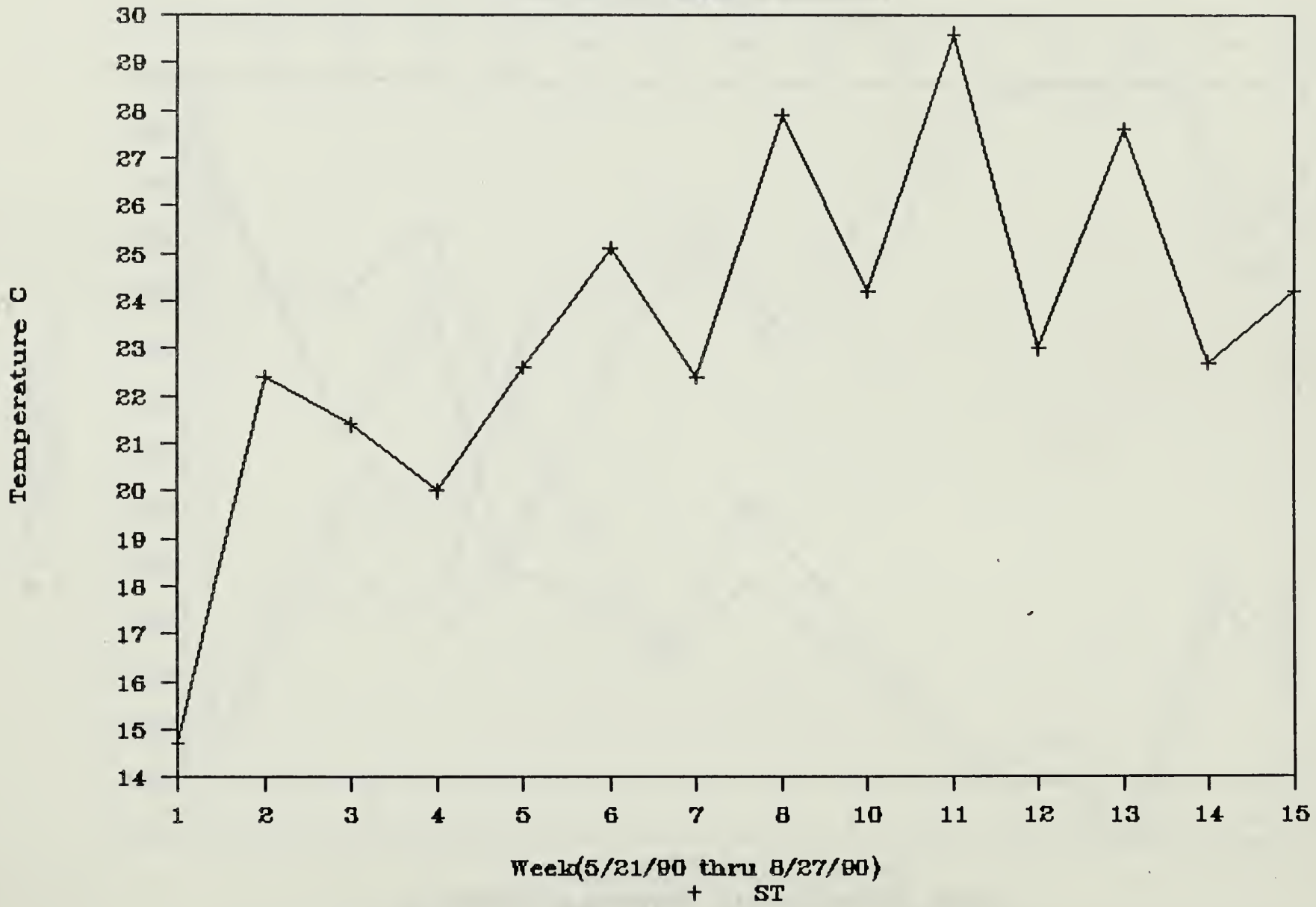
Weekly pH for Jamaica Bay

Site RI-3



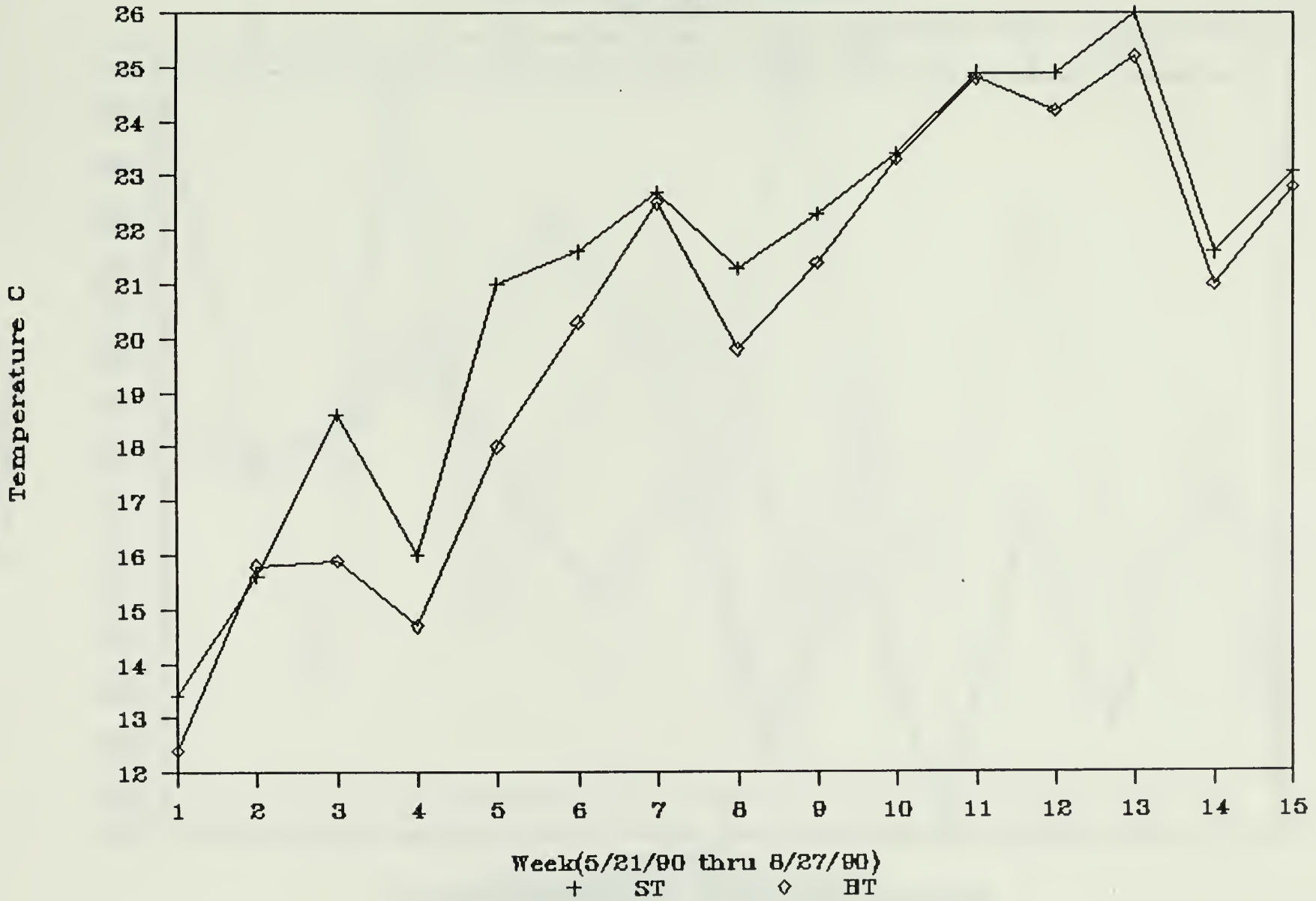
Temperature Marine Park

Site MP-3



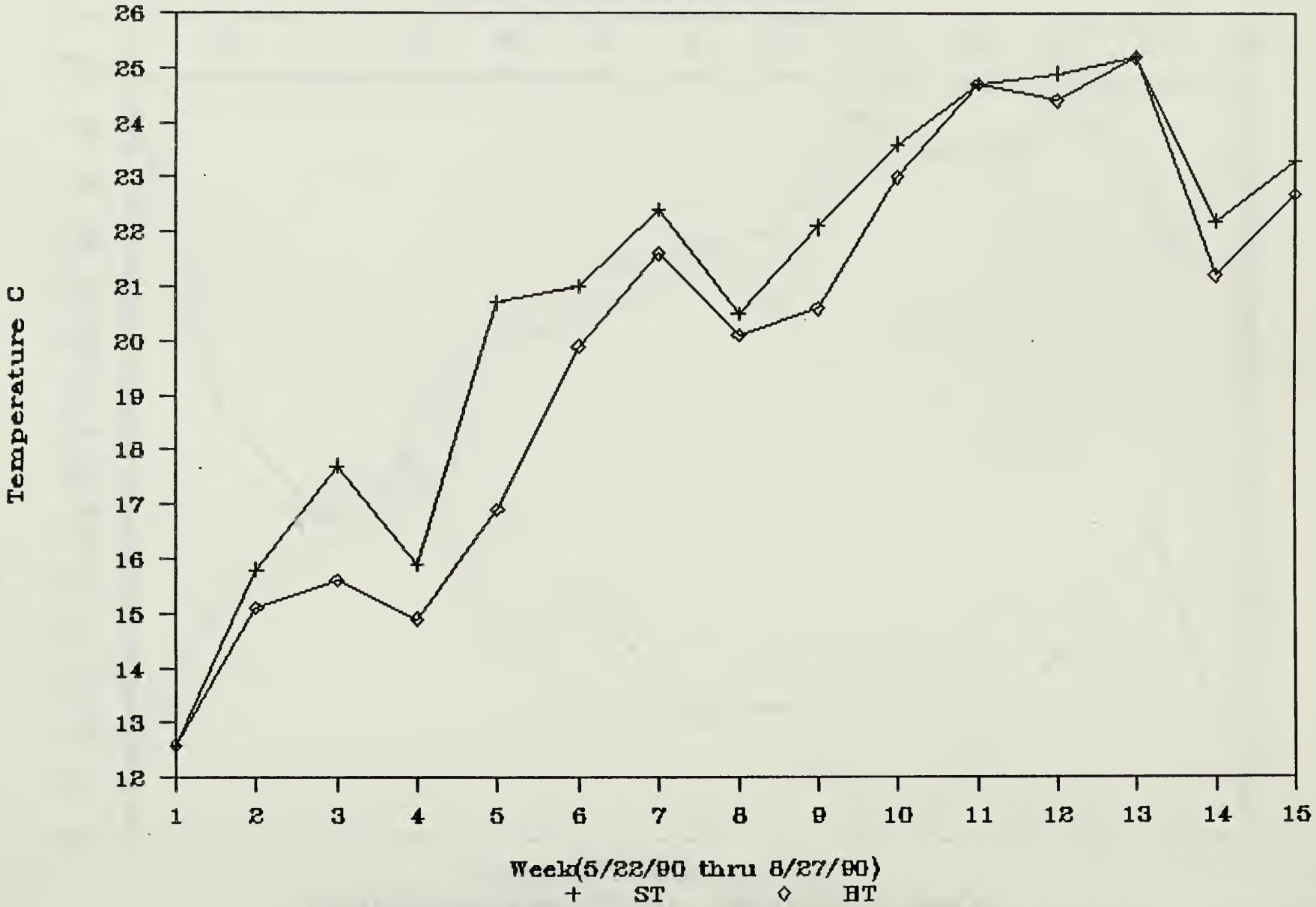
Temperature Marine Park

Site MP-2



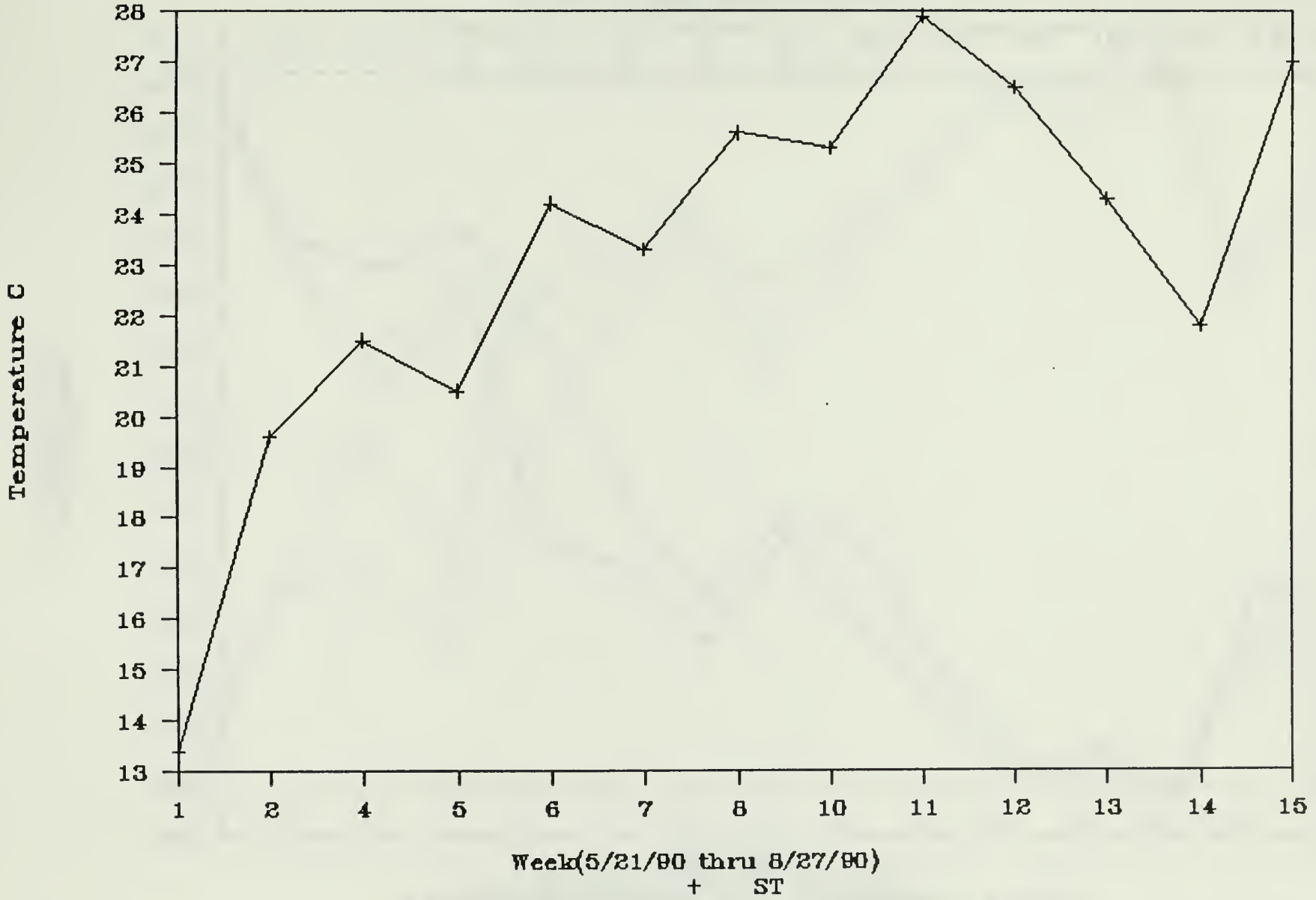
Temperature for Marine Park

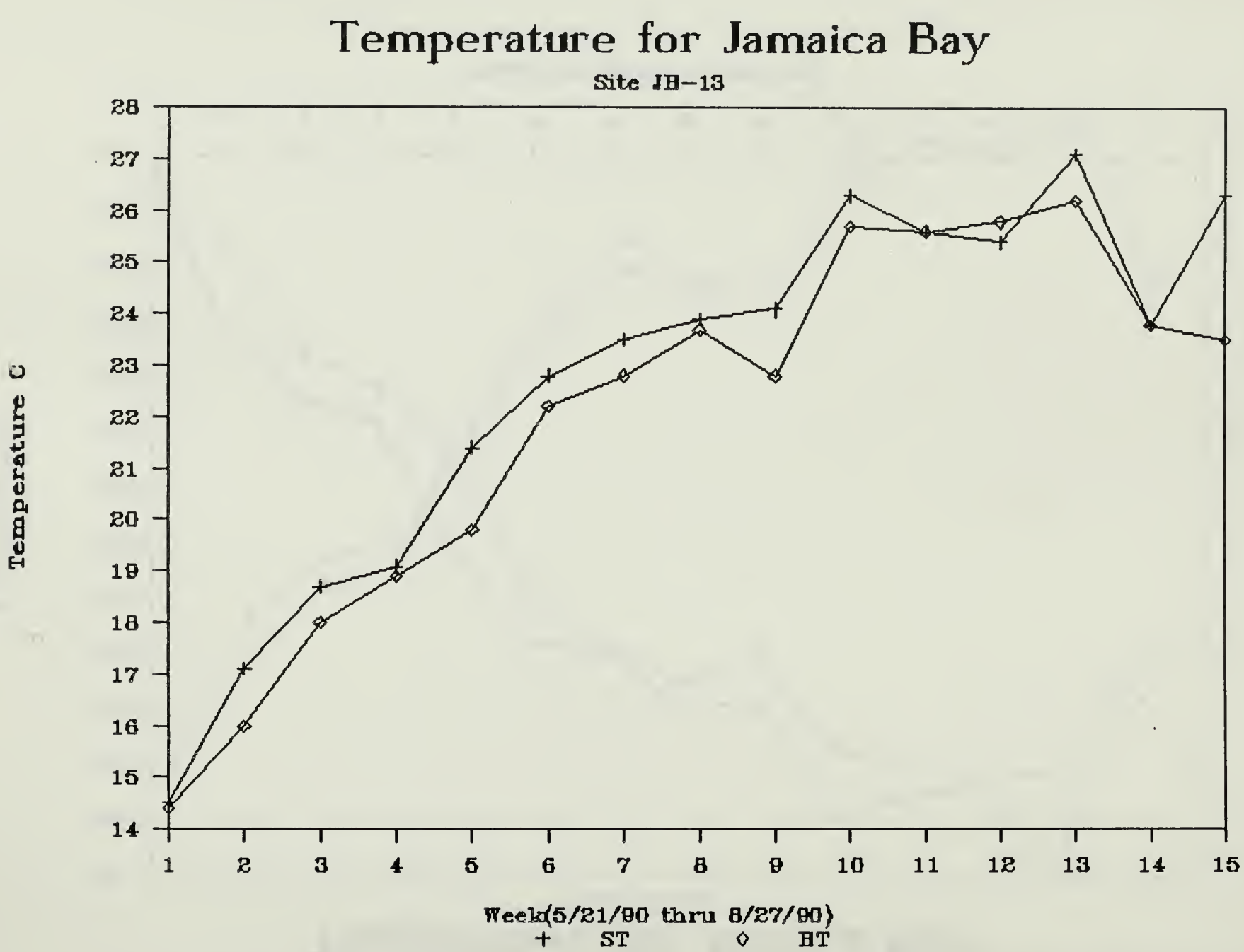
Site MP-1



Temperature for Jamaica Bay

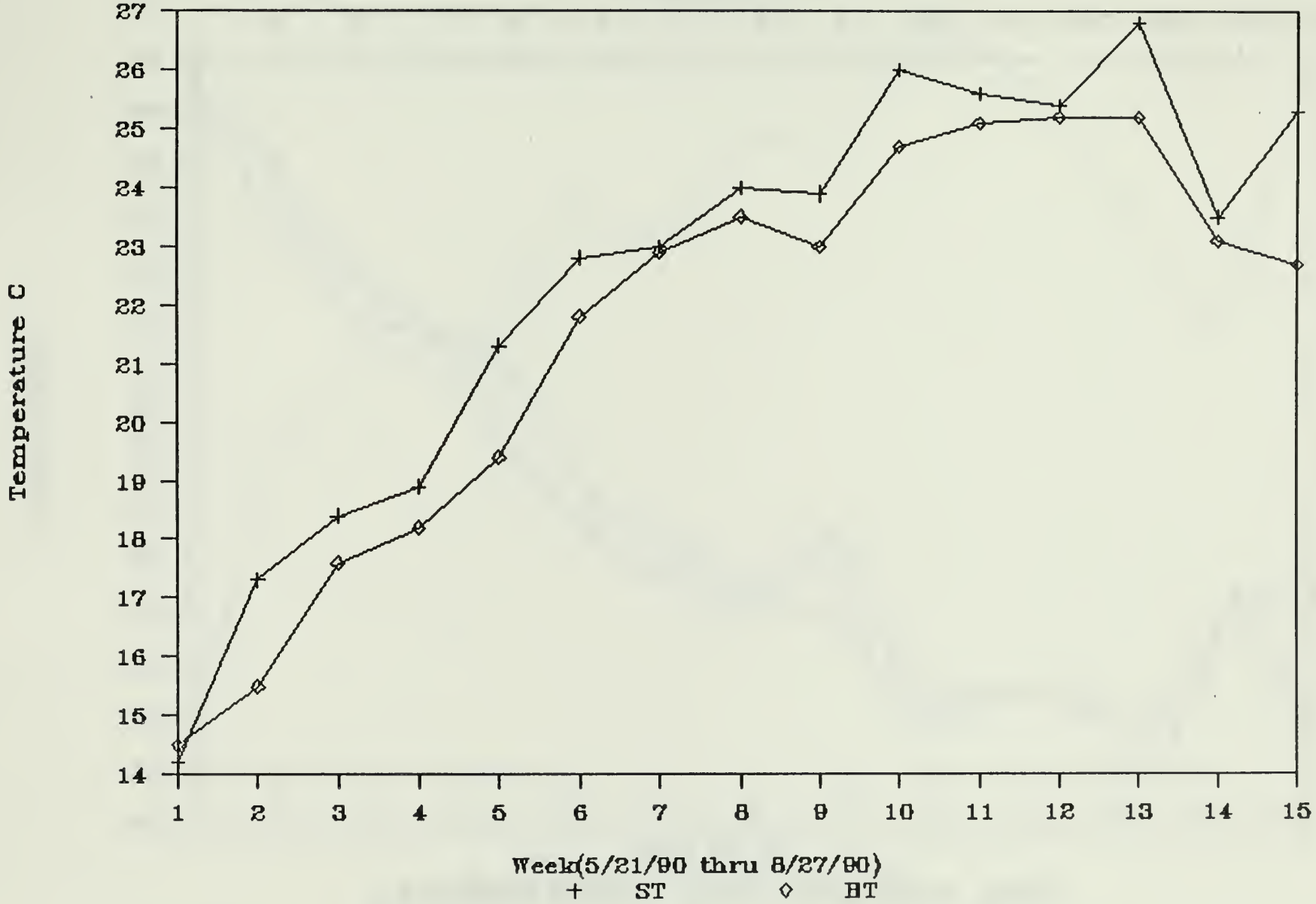
Site JB-14

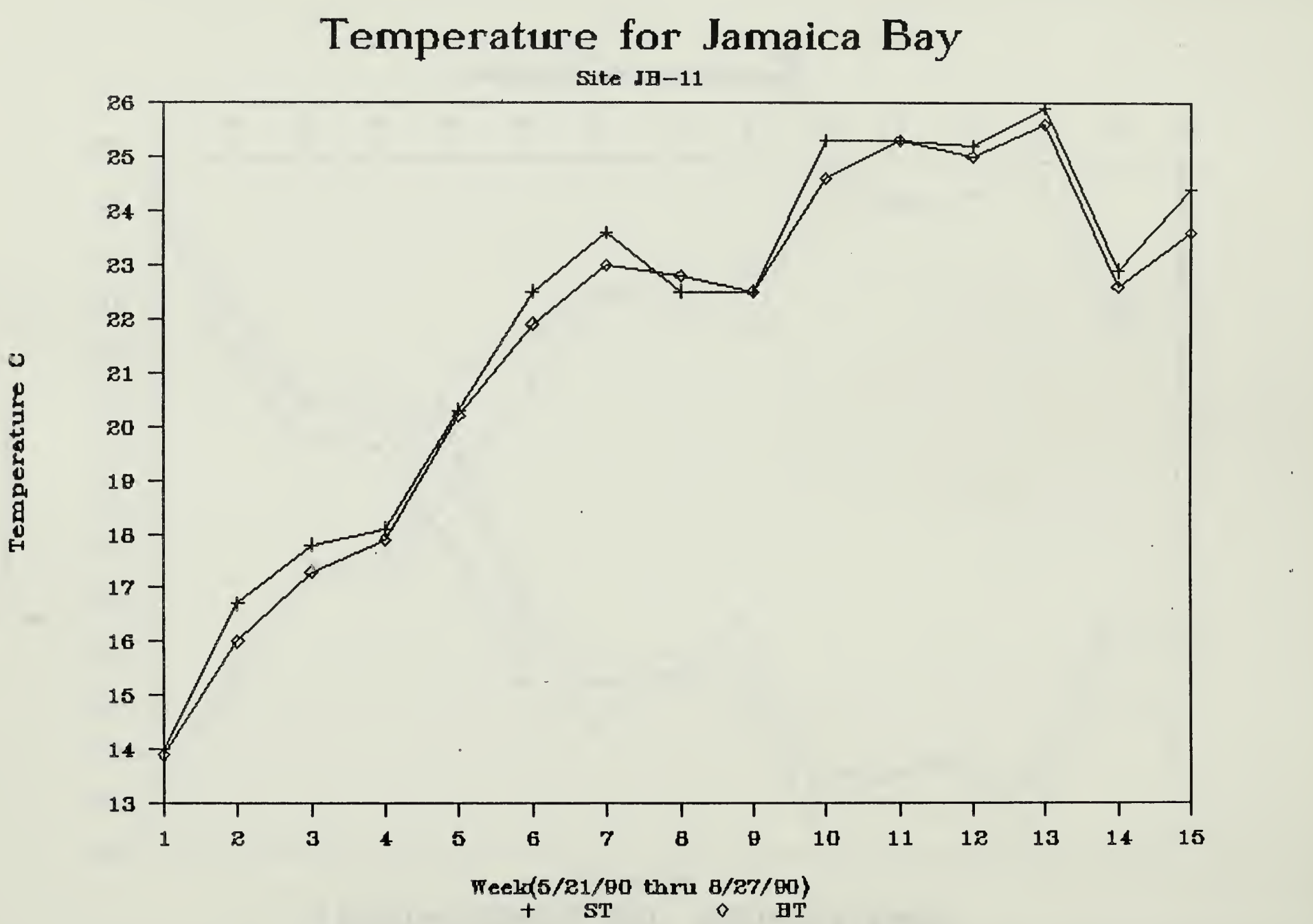



Temperature for Jamaica Bay
Site JB-13
Temperature C
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Week(5/21/90 thru 8/27/90)
+ ST
◊ BT

Temperature for Jamaica Bay

Site JB-12




Temperature for Jamaica Bay
Site JB-11
Temperature C
26
25
24
23
22
21
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19
18
17
16
15
14
13
1
2
3
4
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6
7
8
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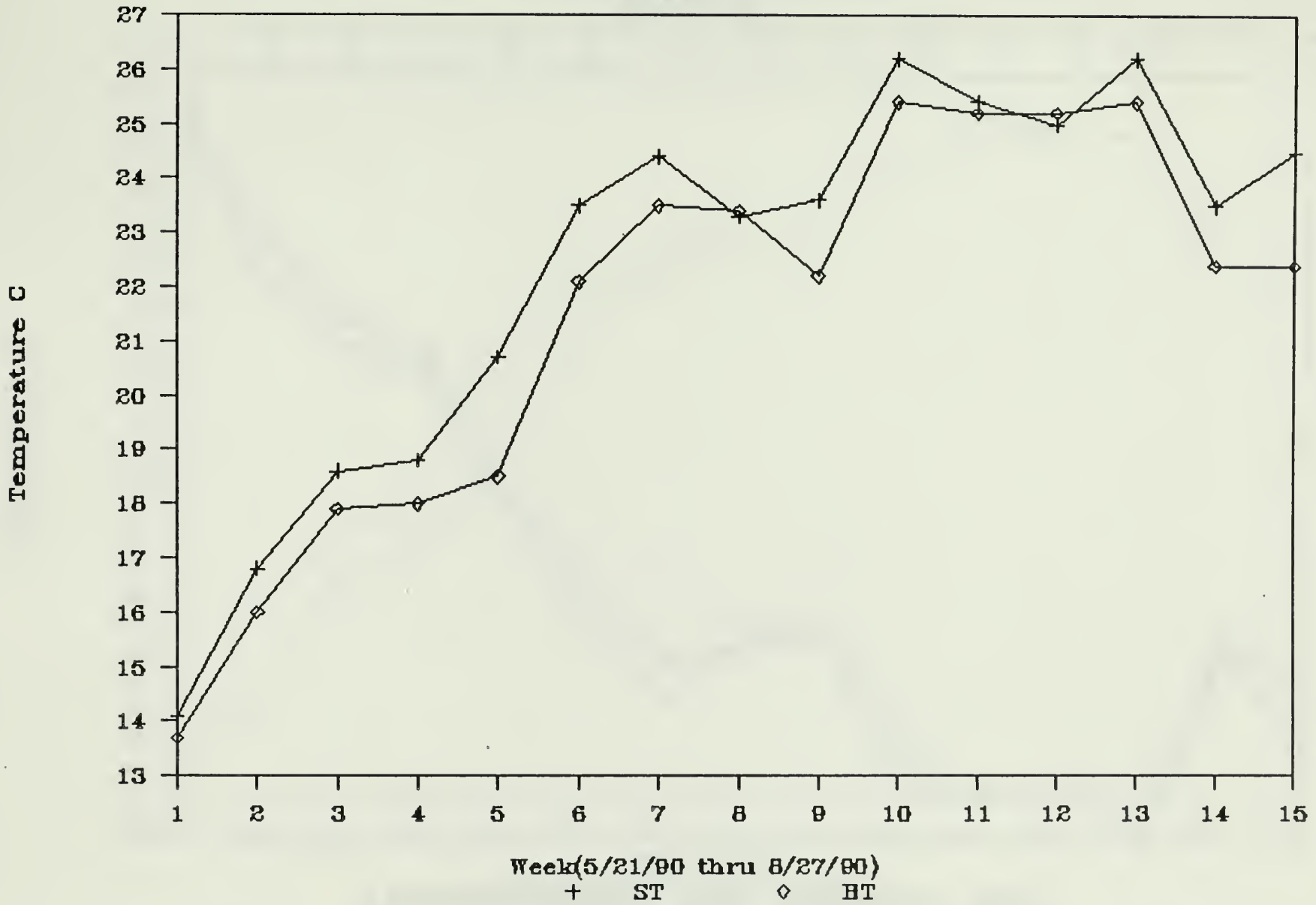
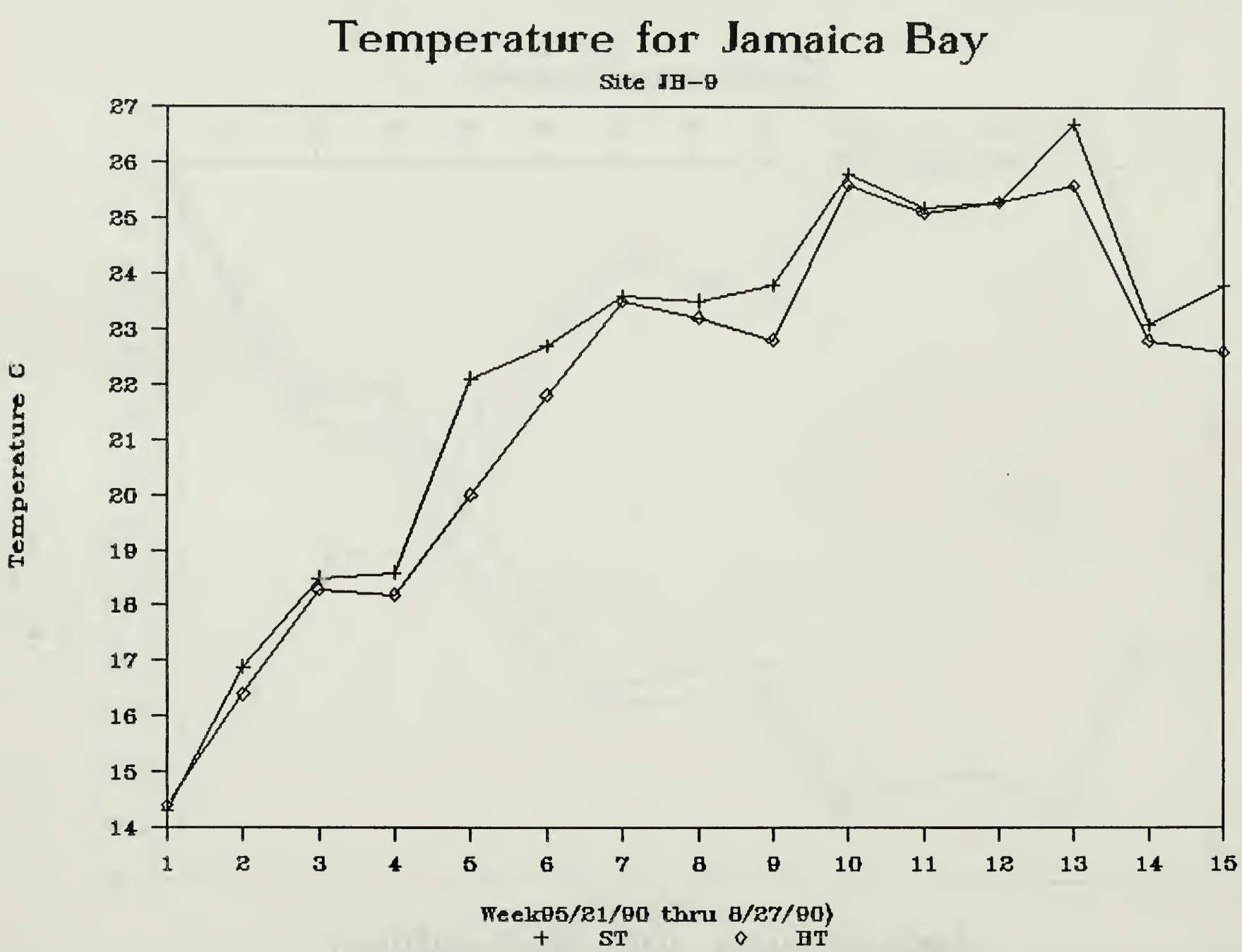
12
13
14
15
Week(5/21/90 thru 8/27/90)
+ ST
◇ BT

Temperature for Jamaica Bay

Site JB-10




Temperature for Jamaica Bay
Site JB-9
Temperature C
27
26
25
24
23
22
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20
19
18
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15
14
1
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6
7
8
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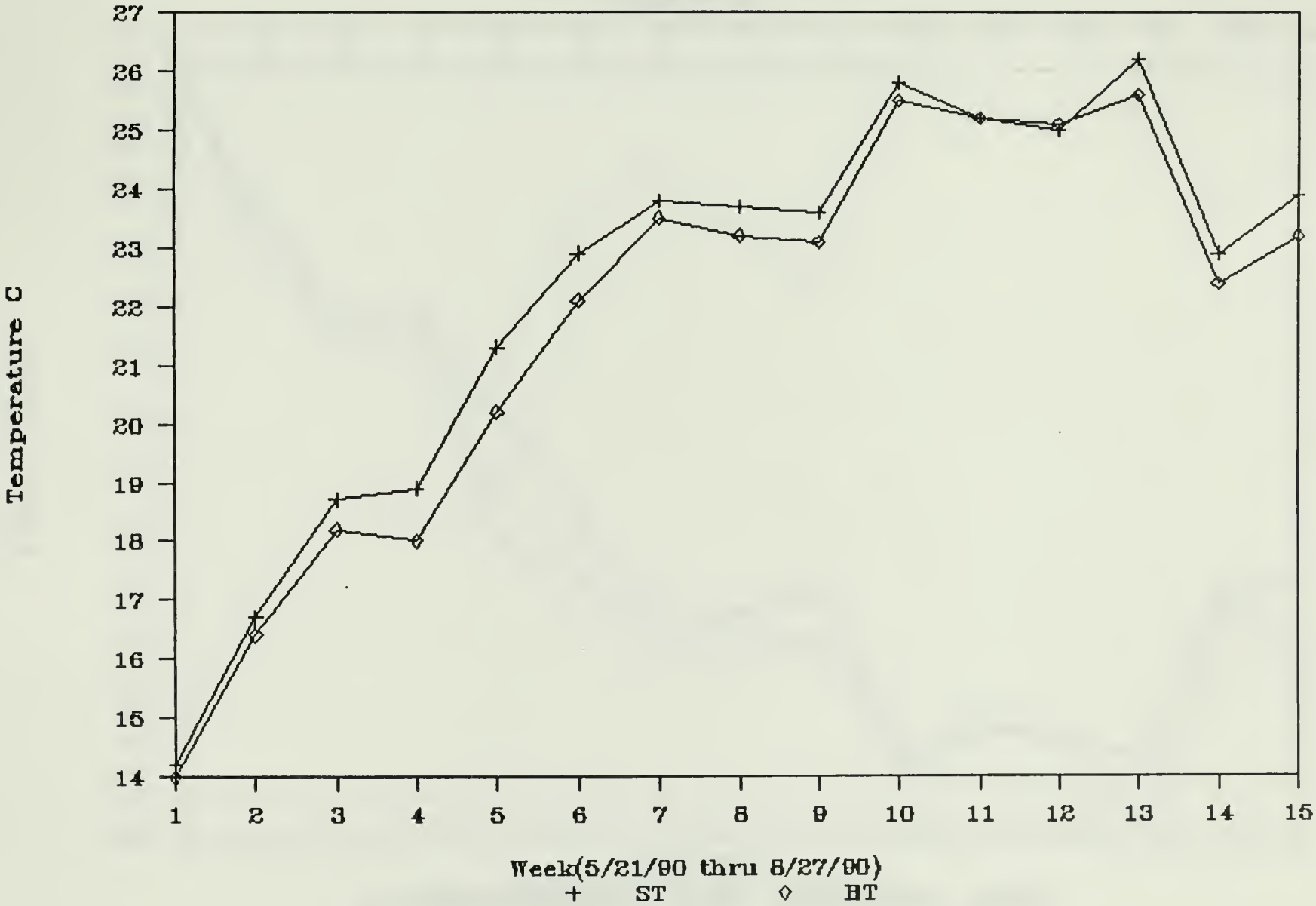
10
11
12
13
14
15
Week05/21/90 thru 8/27/90)
+ ST
◇ BT

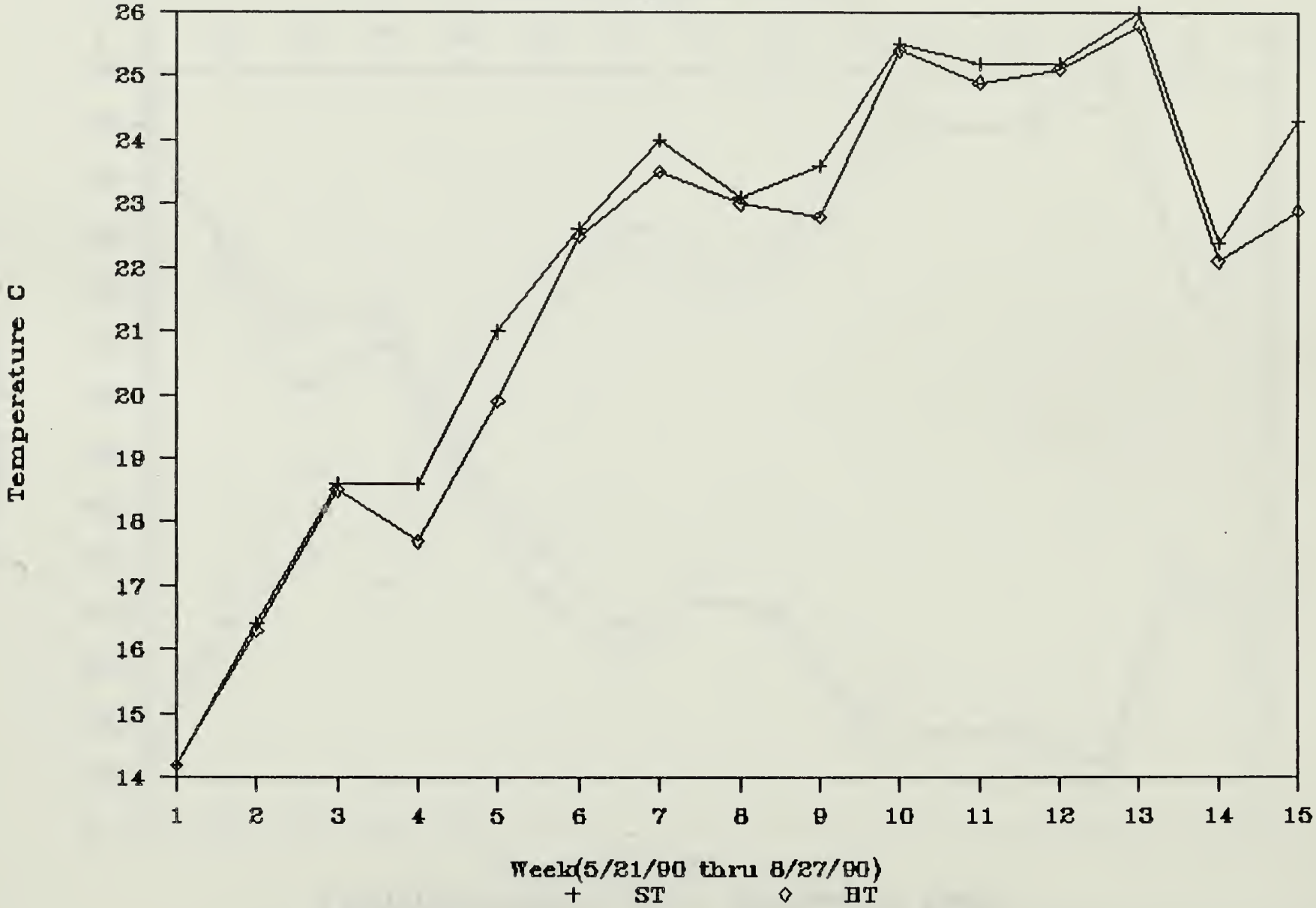
Temperature for Jamaica Bay

Site JB-8



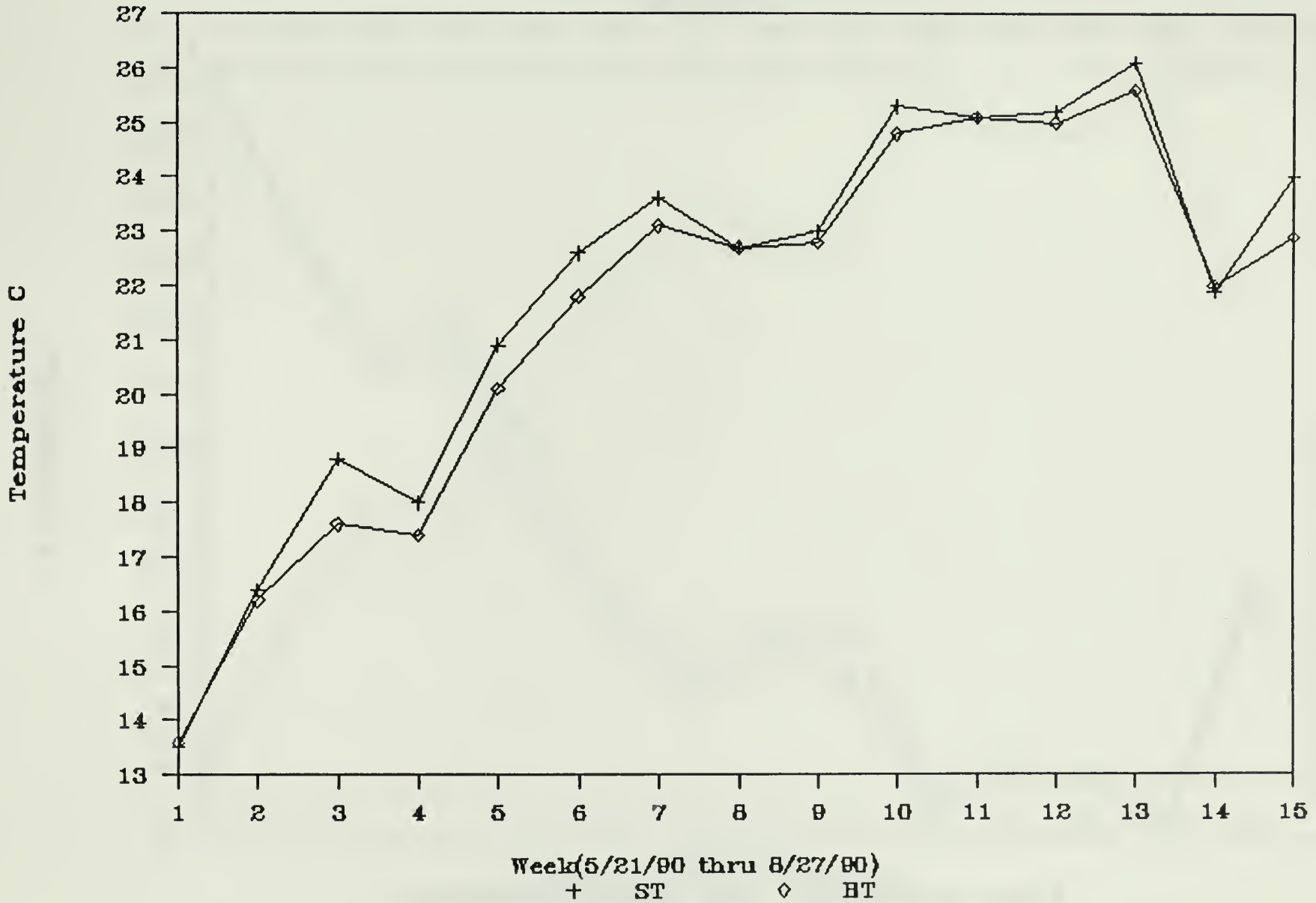
Temperature for Jamaica Bay

Site JB-7



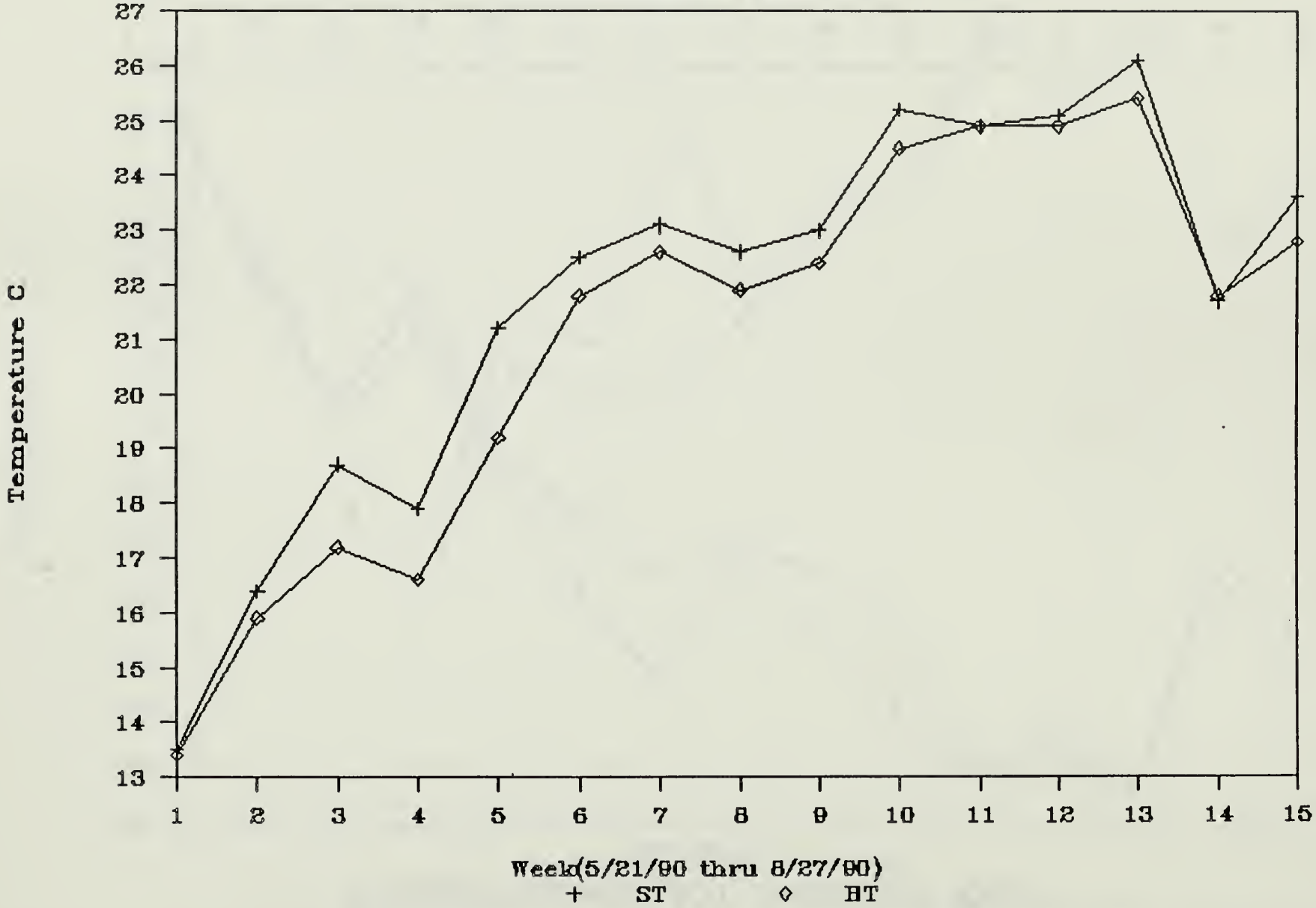
Temperature for Jamaica Bay

Site JB-6A



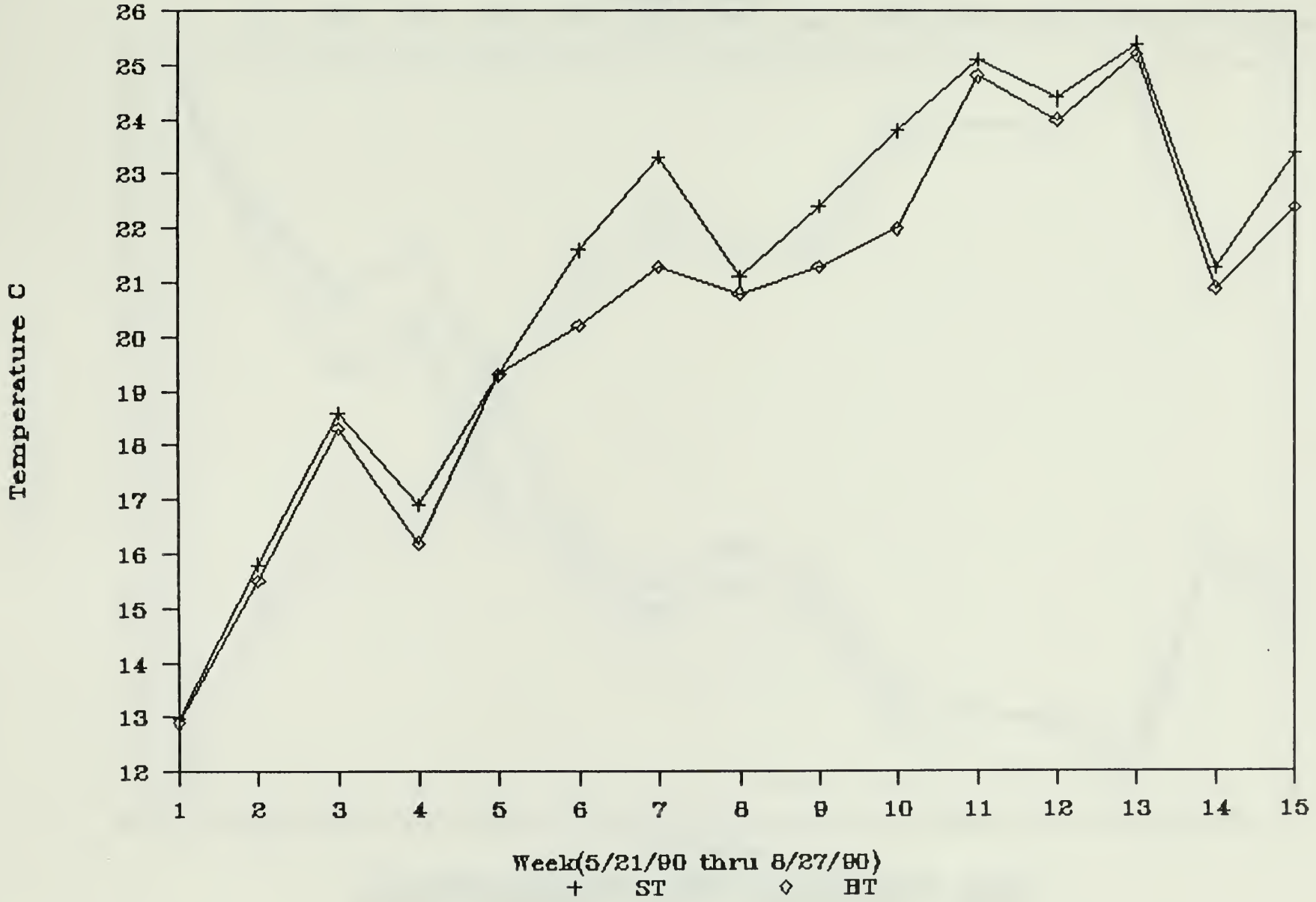
Temperature for Jamaica Bay

Site JB-6



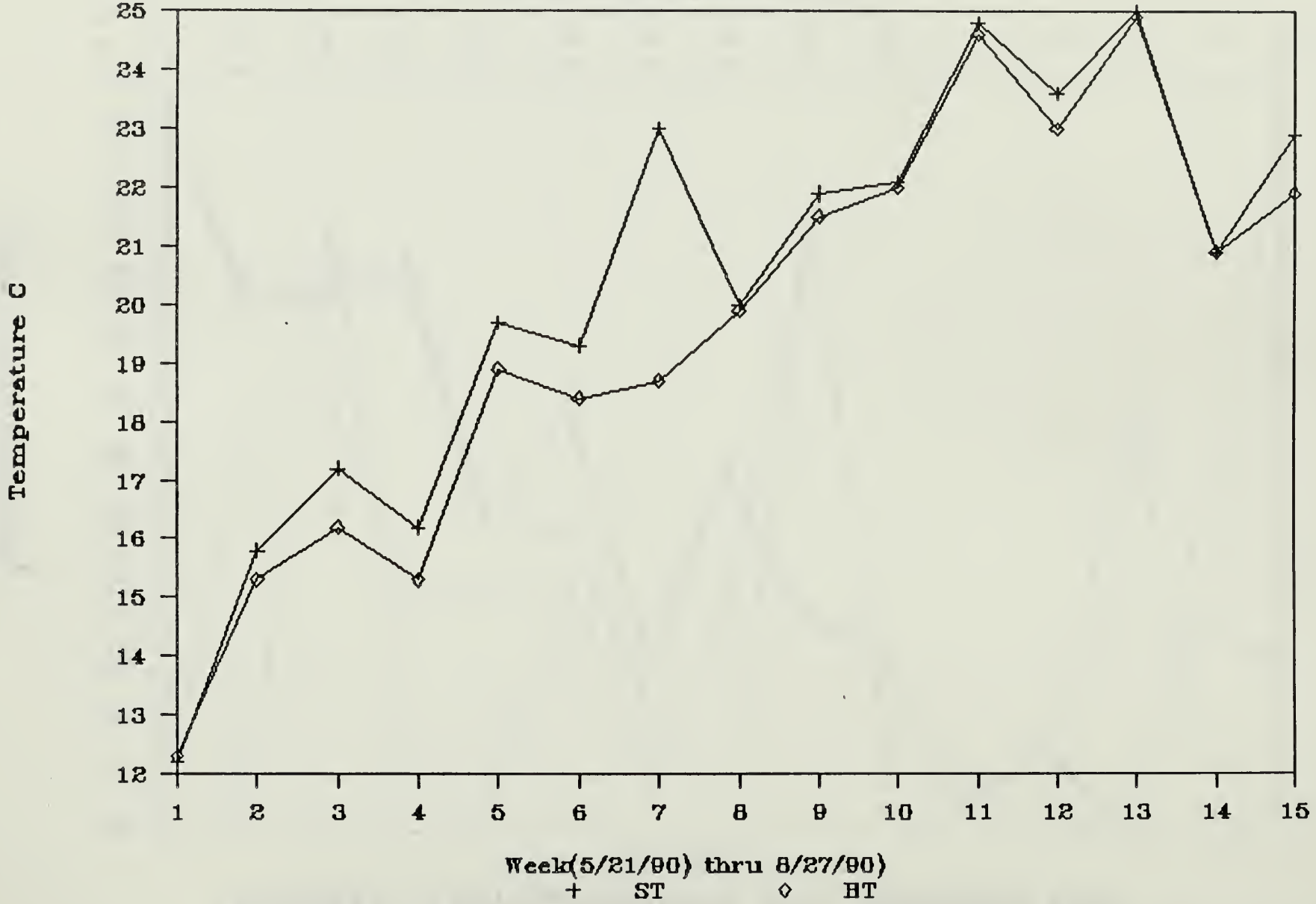
Temperature for Jamaica Bay

Site JB-5



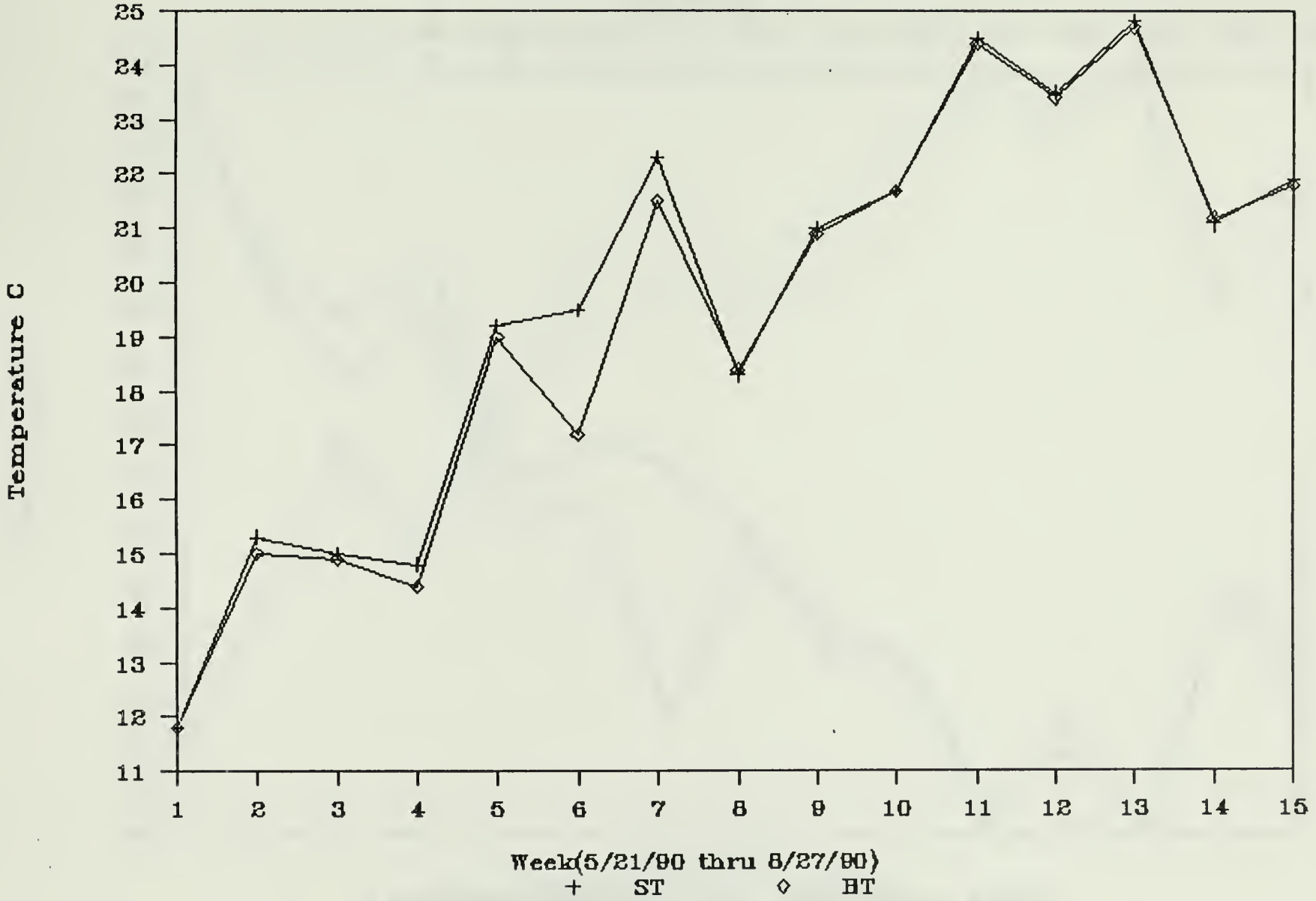
Temperature for Jamaica Bay

Site MPB-4



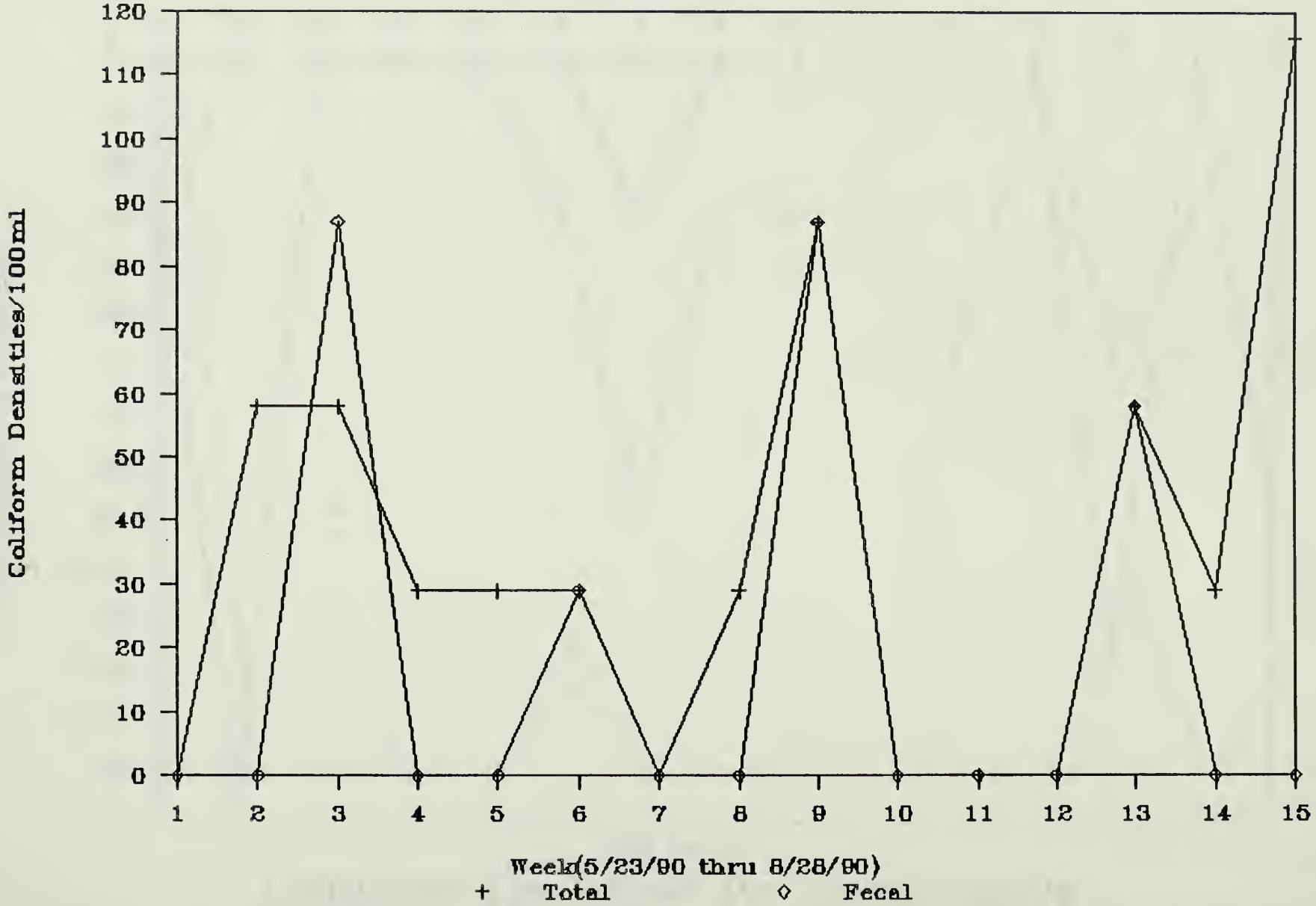
Weekly Temperatures for Jamaica Bay

Site RI-3



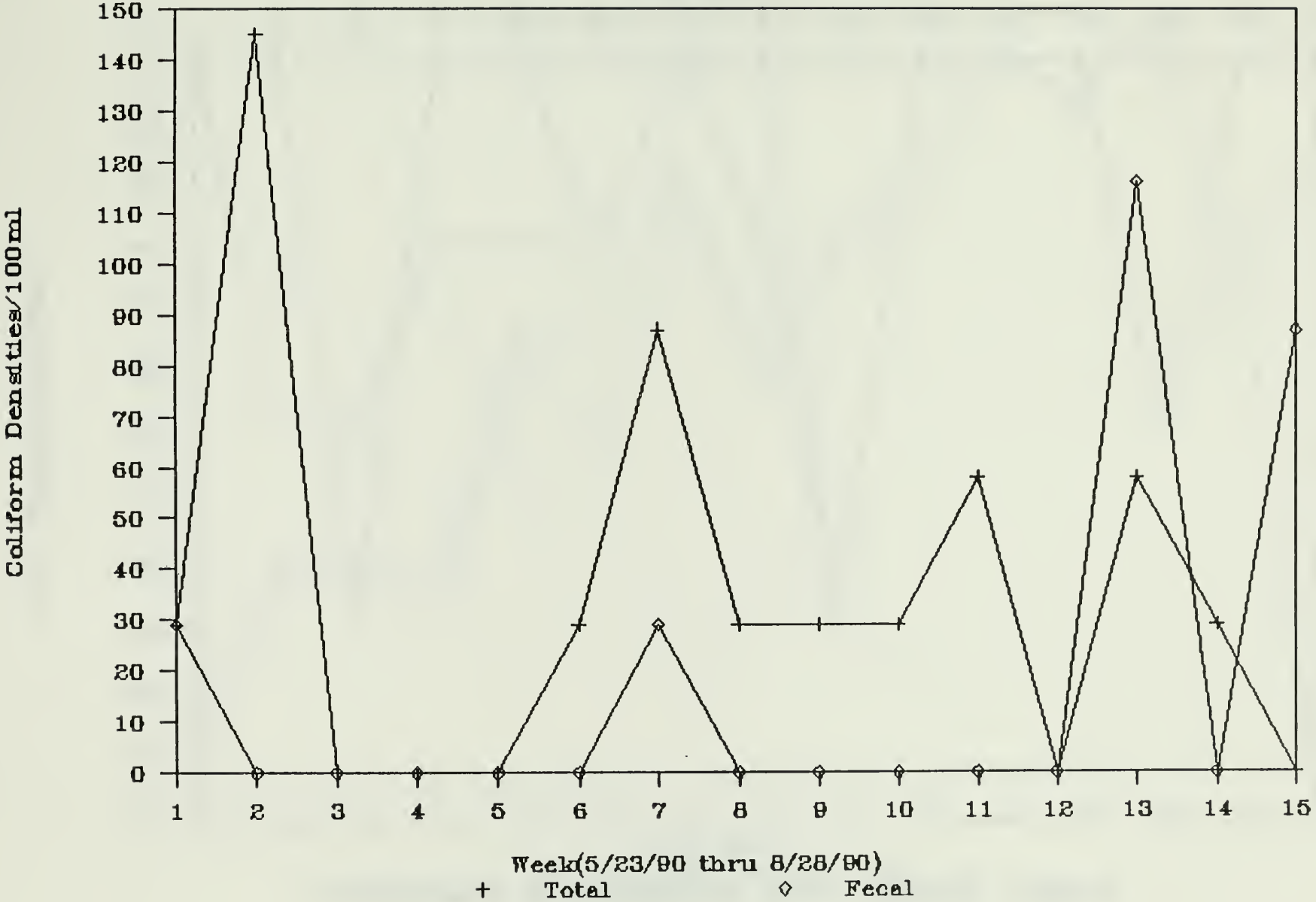
Coliform Densities for Sandy Hook

Site SH-6



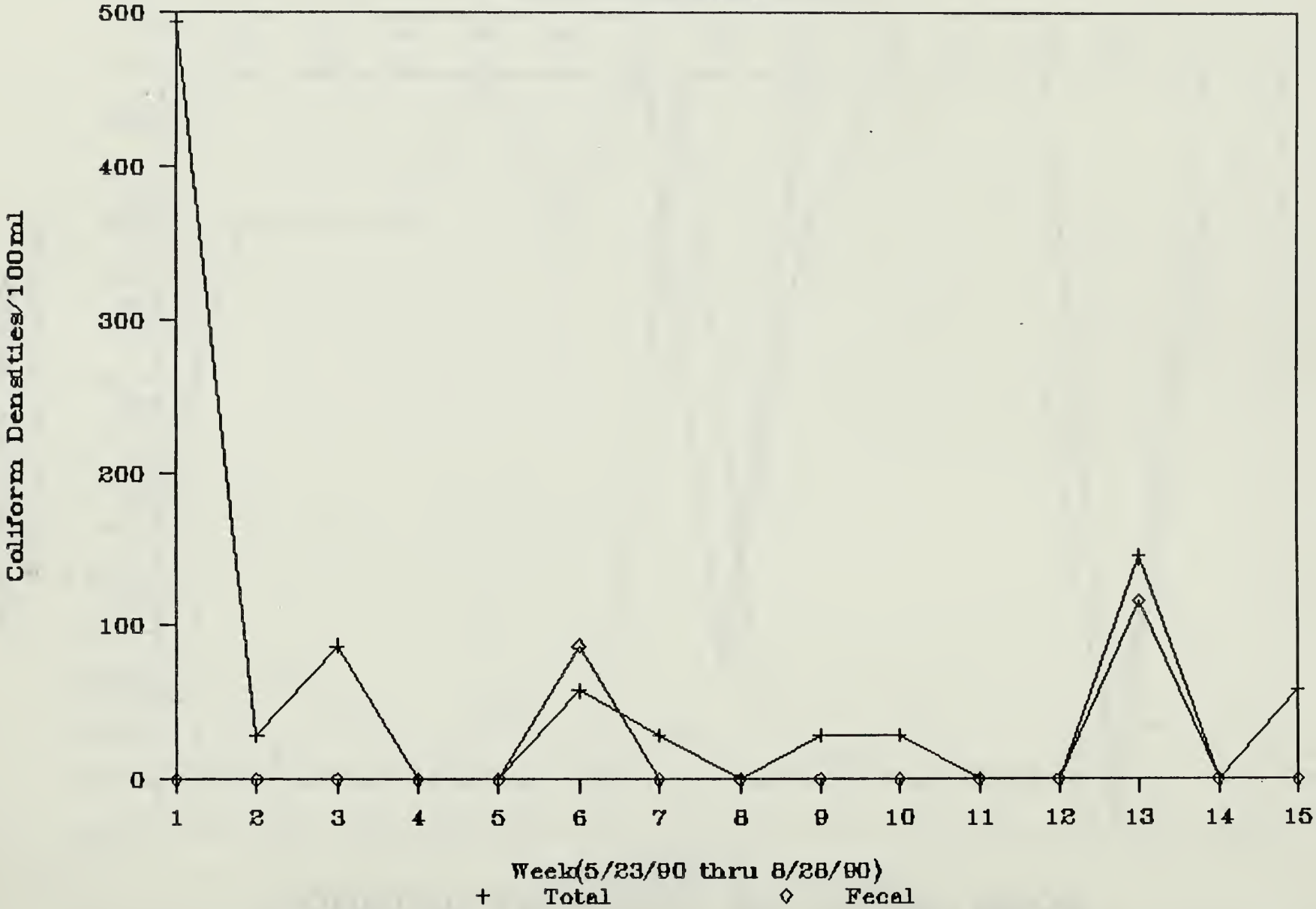
Coliform Densities for Sandy Hook

Site SH-5



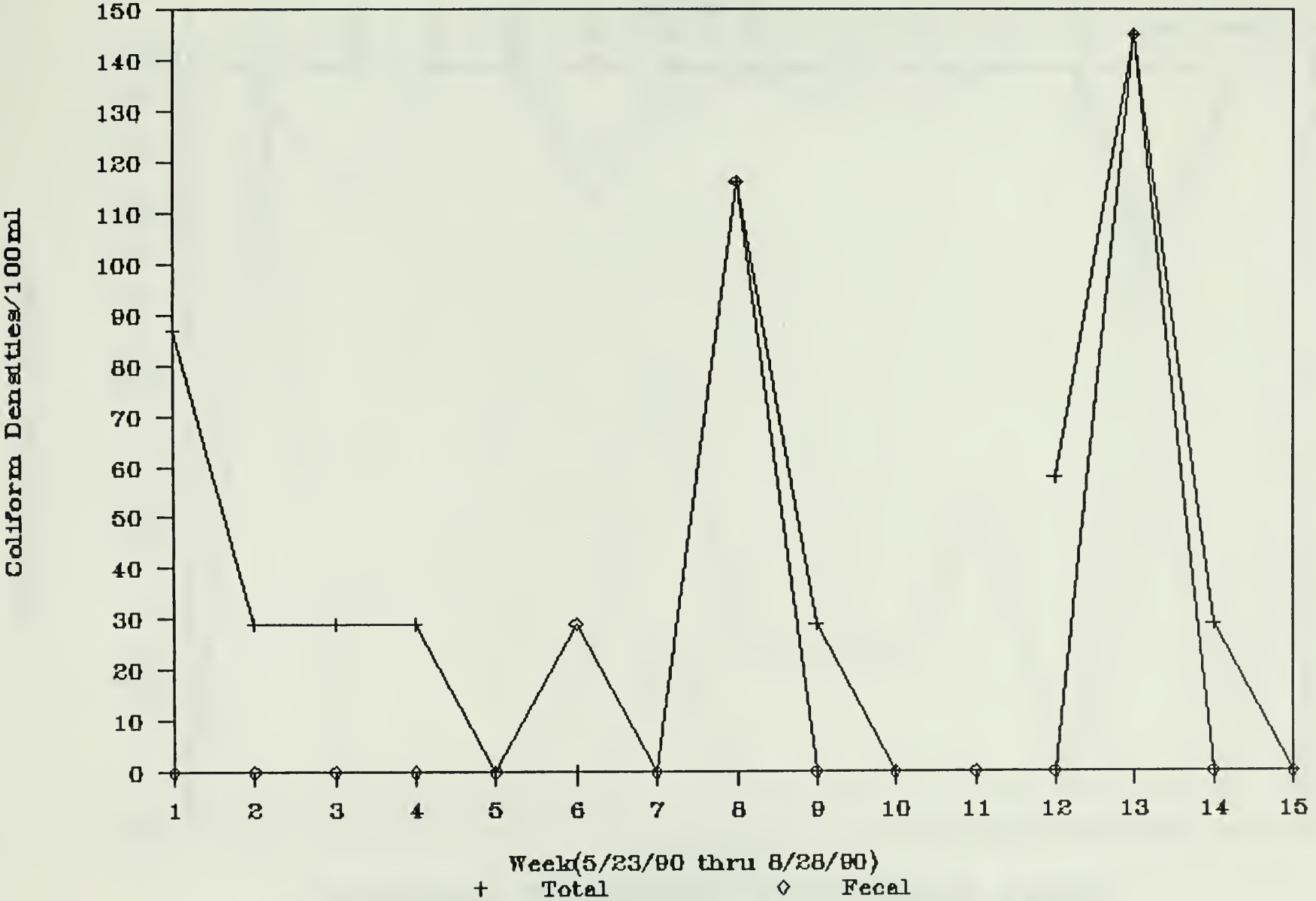
Coliform Densities for Sandy Hook

Site SH-4



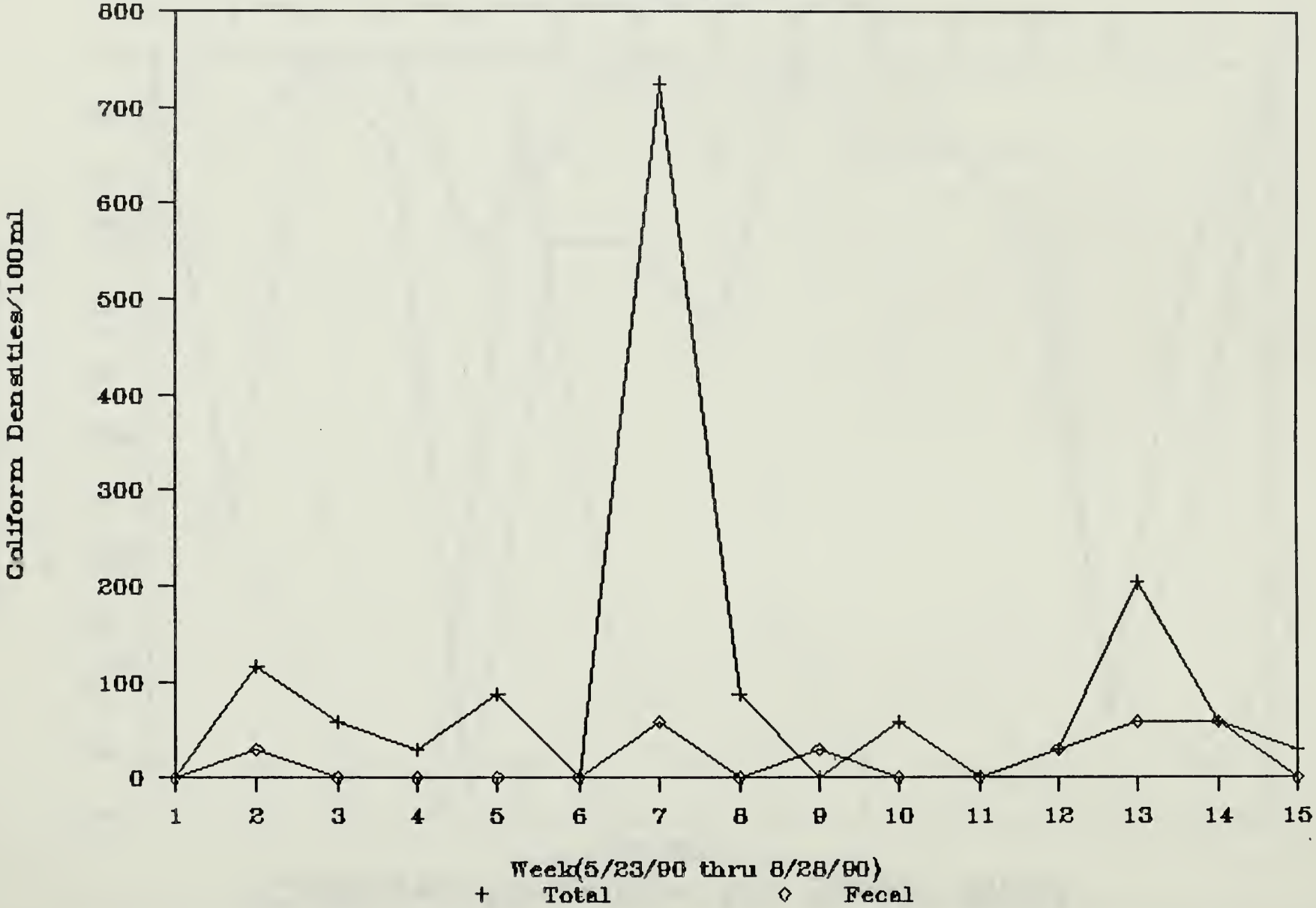
Coliform Densities for Sandy Hook

Site SH-3



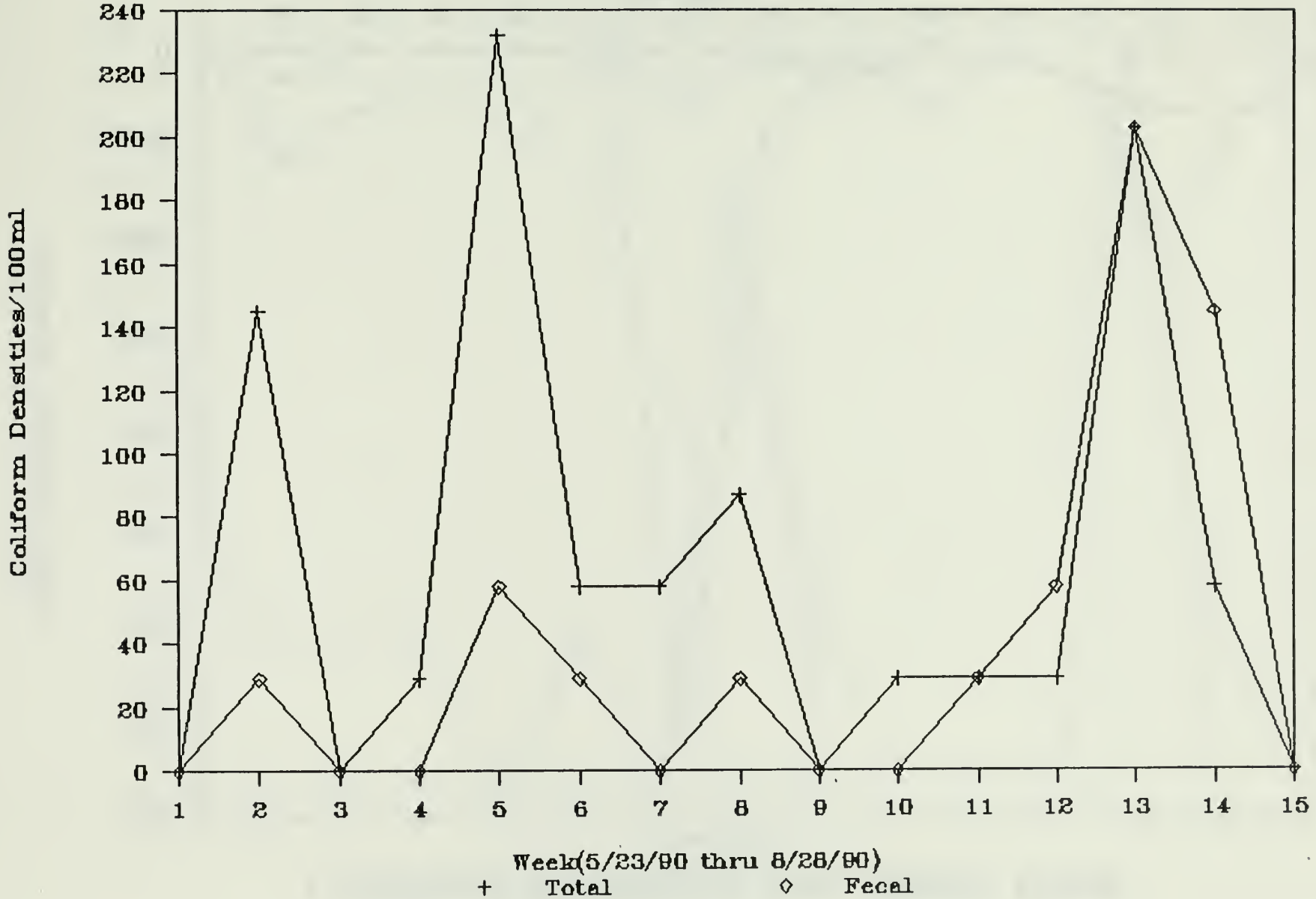
Coliform Densities for Sandy Hook

Site SH-2



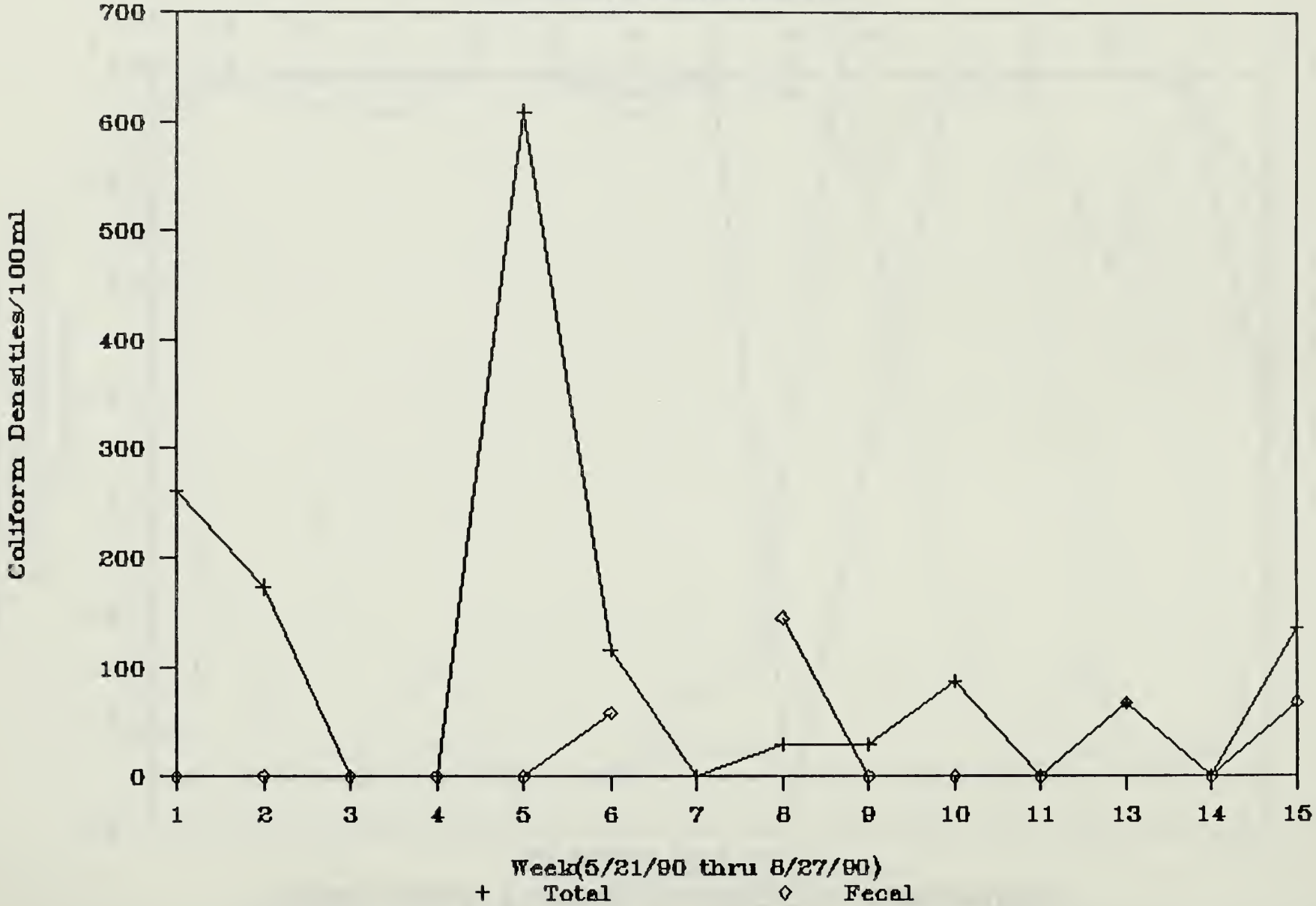
Coliform Densities for Sandy Hook

Site SH-1



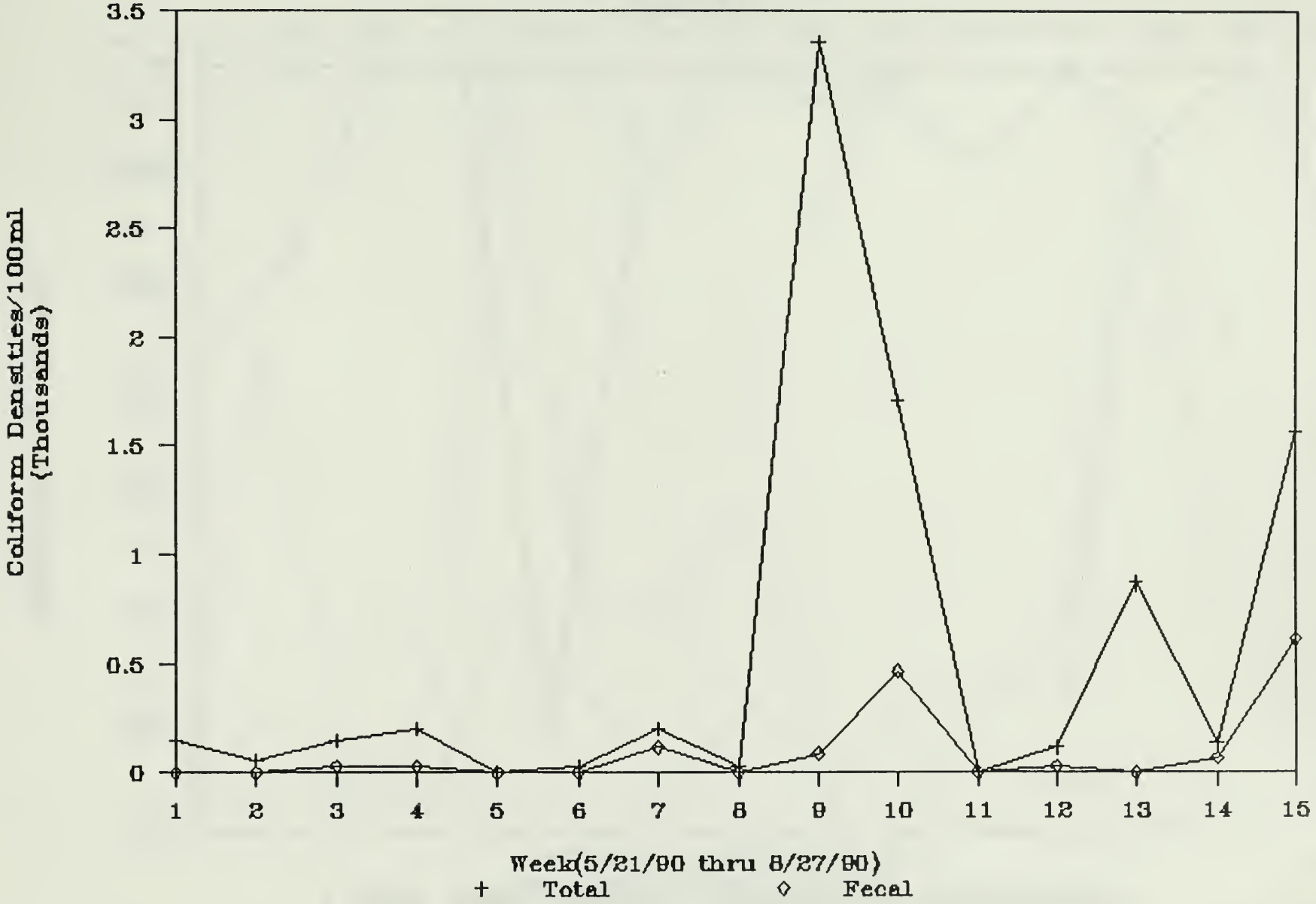
Total and Fecal Coliform Densities

For Marine Park Site MP-3



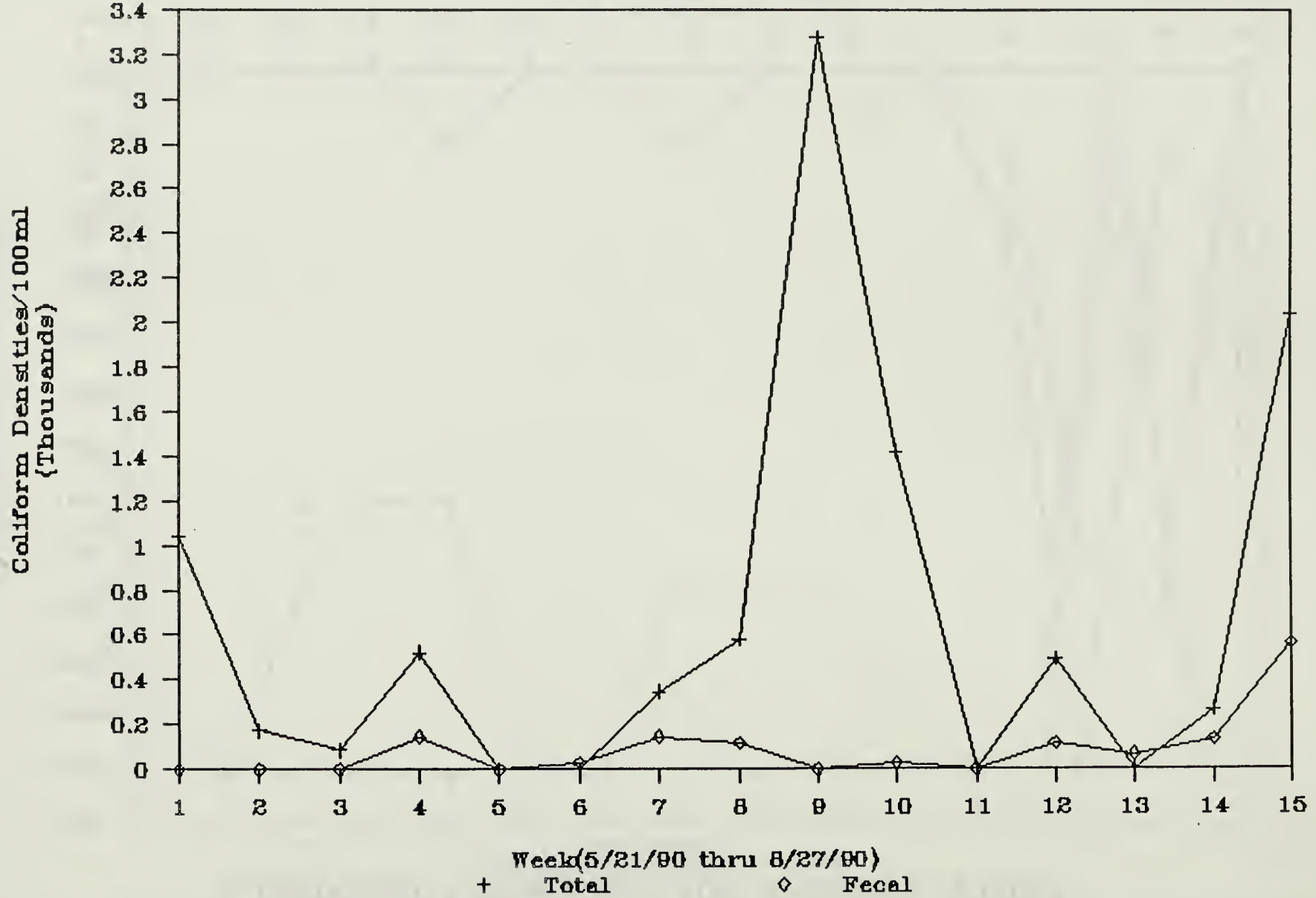
Total and Fecal Coliform Densities

for Marine Park Site 2

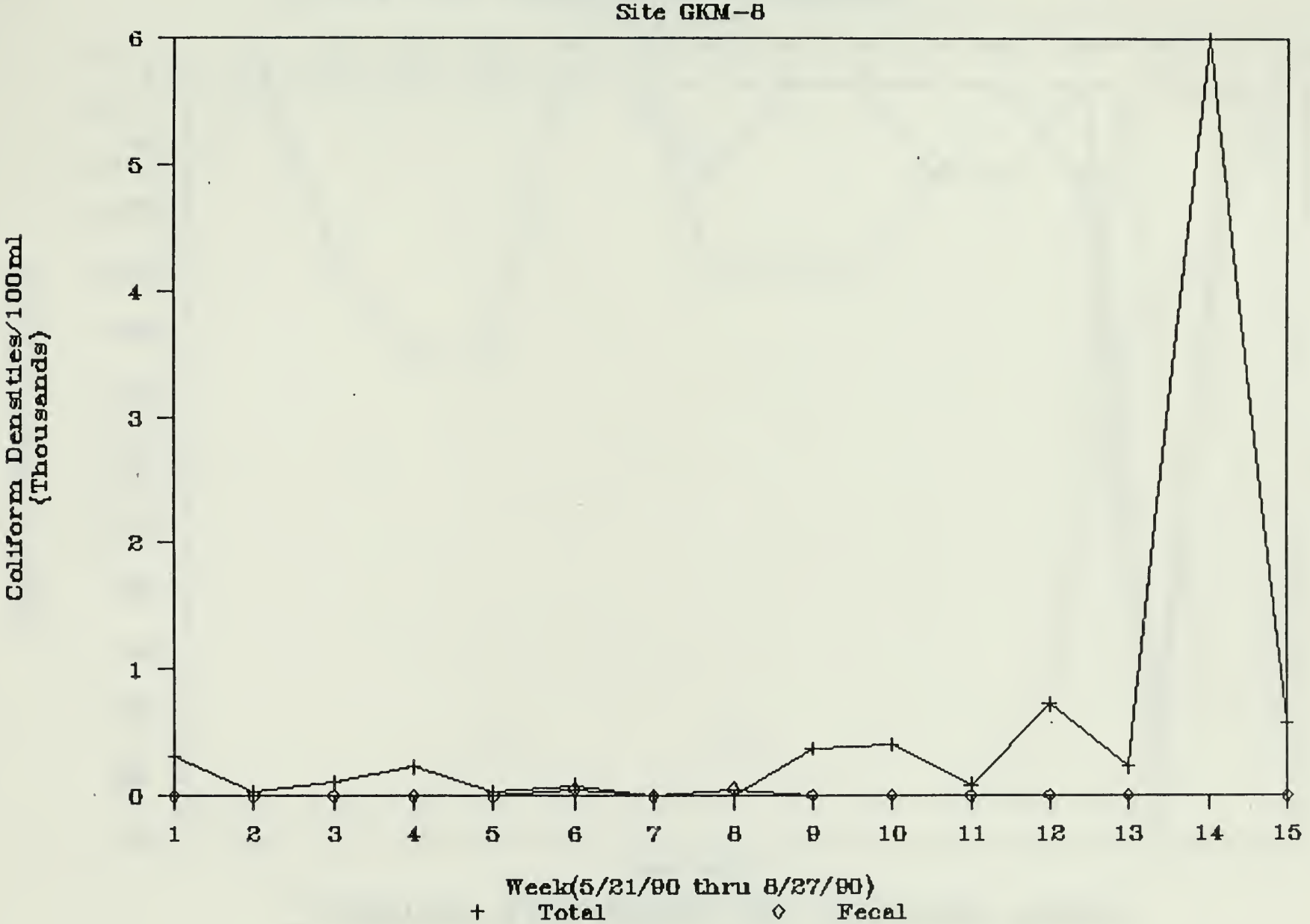


Total and Fecal Coliform Densities

for Marine Park Site 1

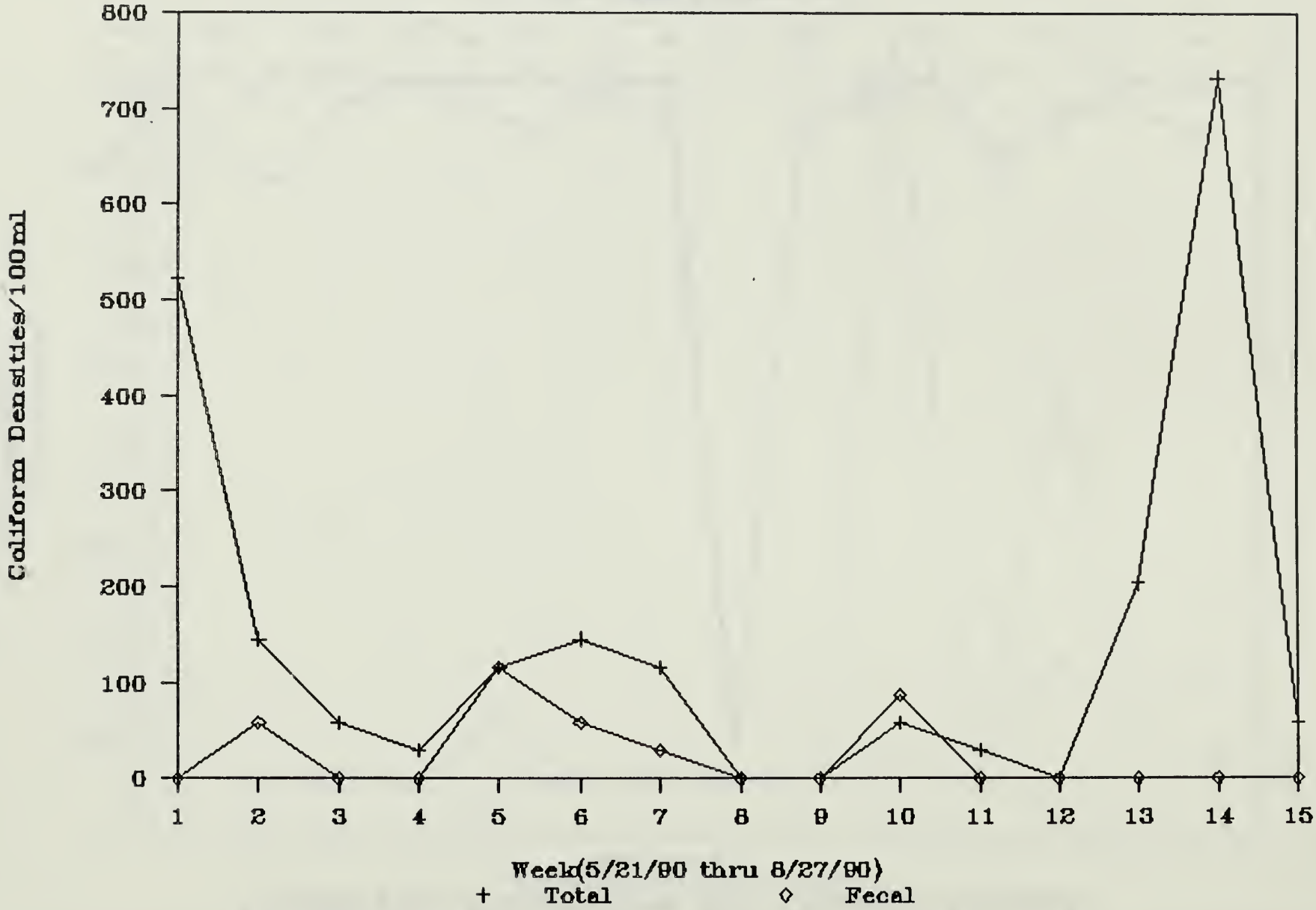


Coliform Densities for Staten Island

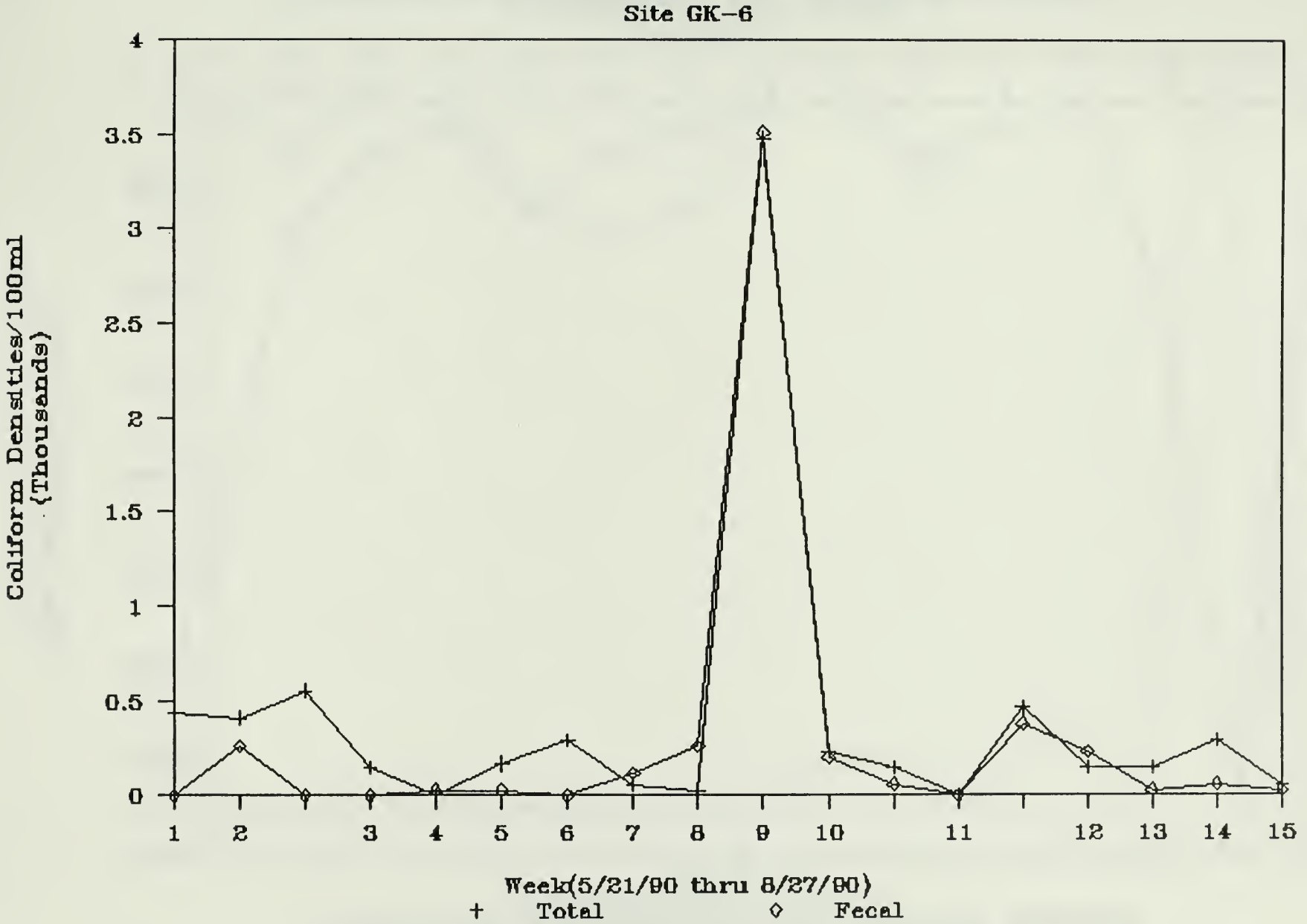


Coliform Densities for Staten Island

Site CP-7

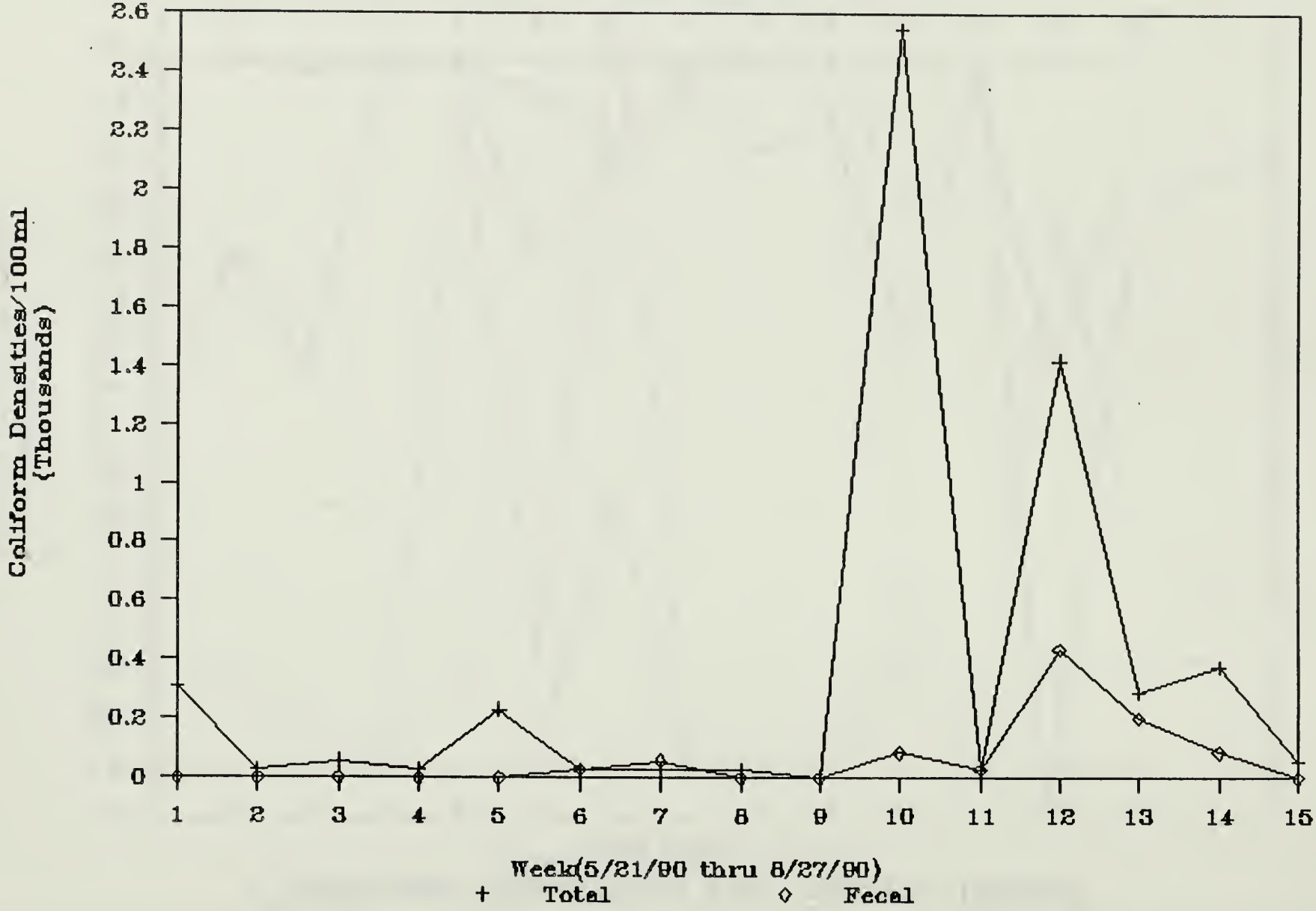


Coliform Densities for Staten Island



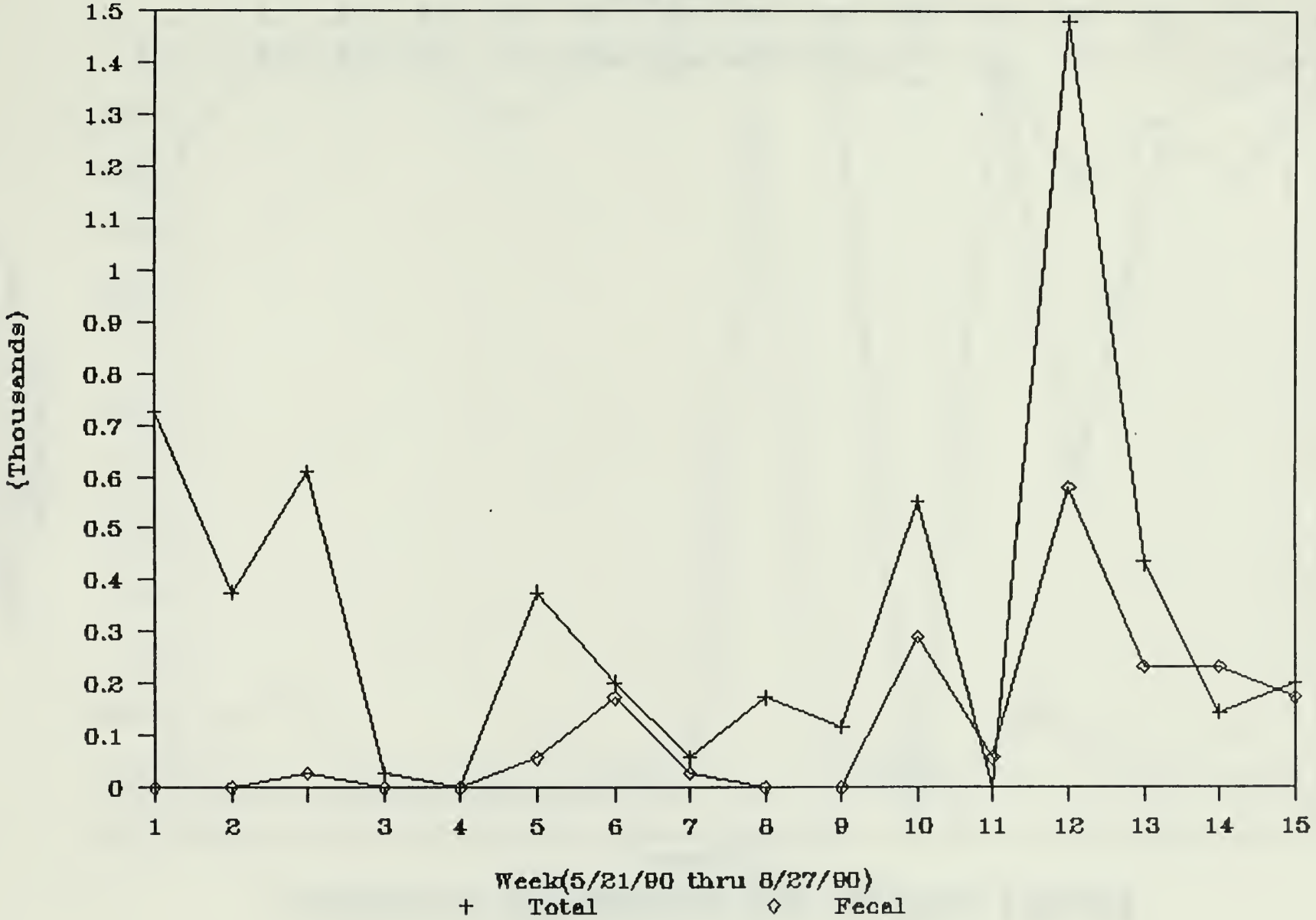
Coliform Densities for Staten Island

Site OB-5

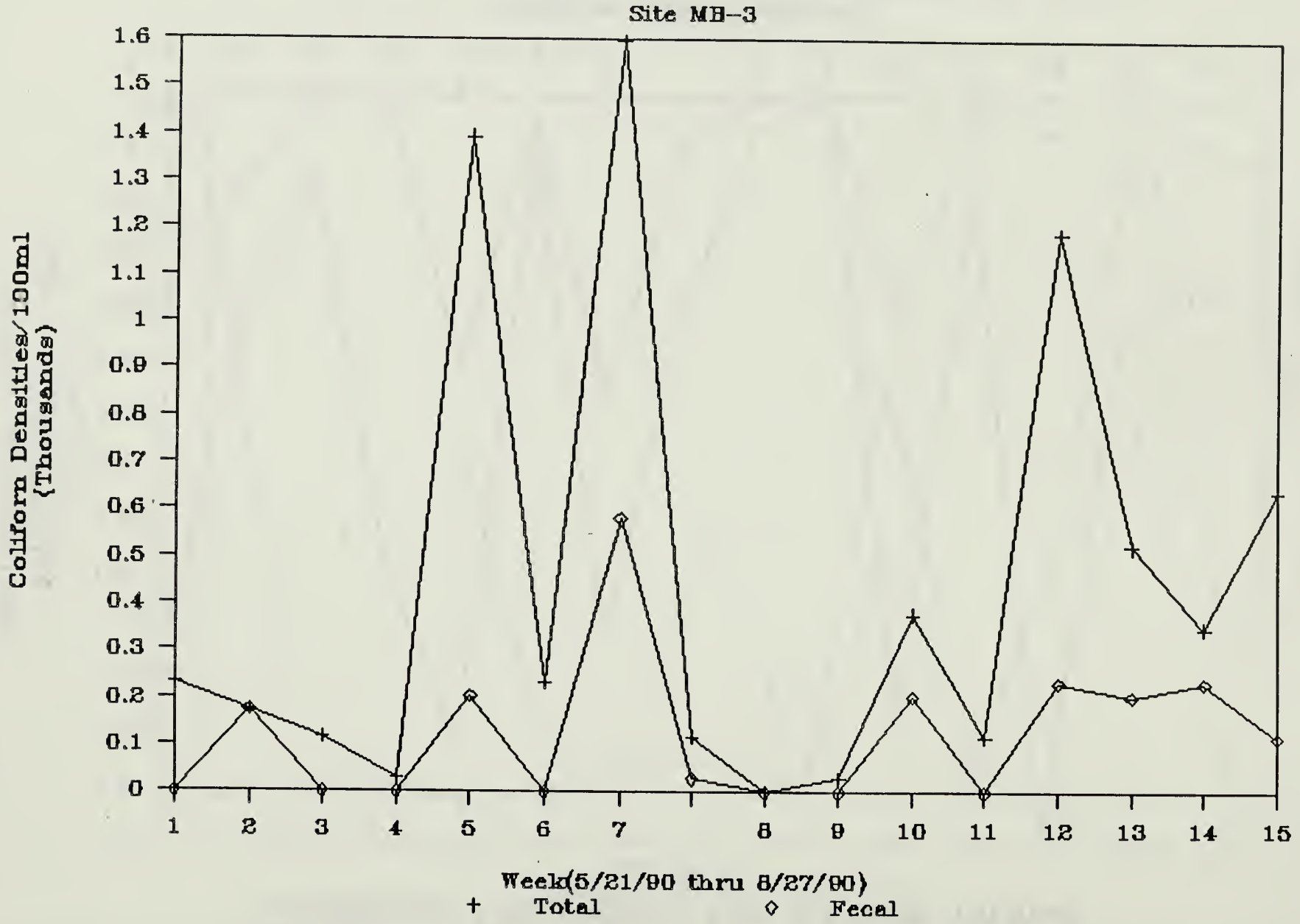


Coliform Densities for Staten Island

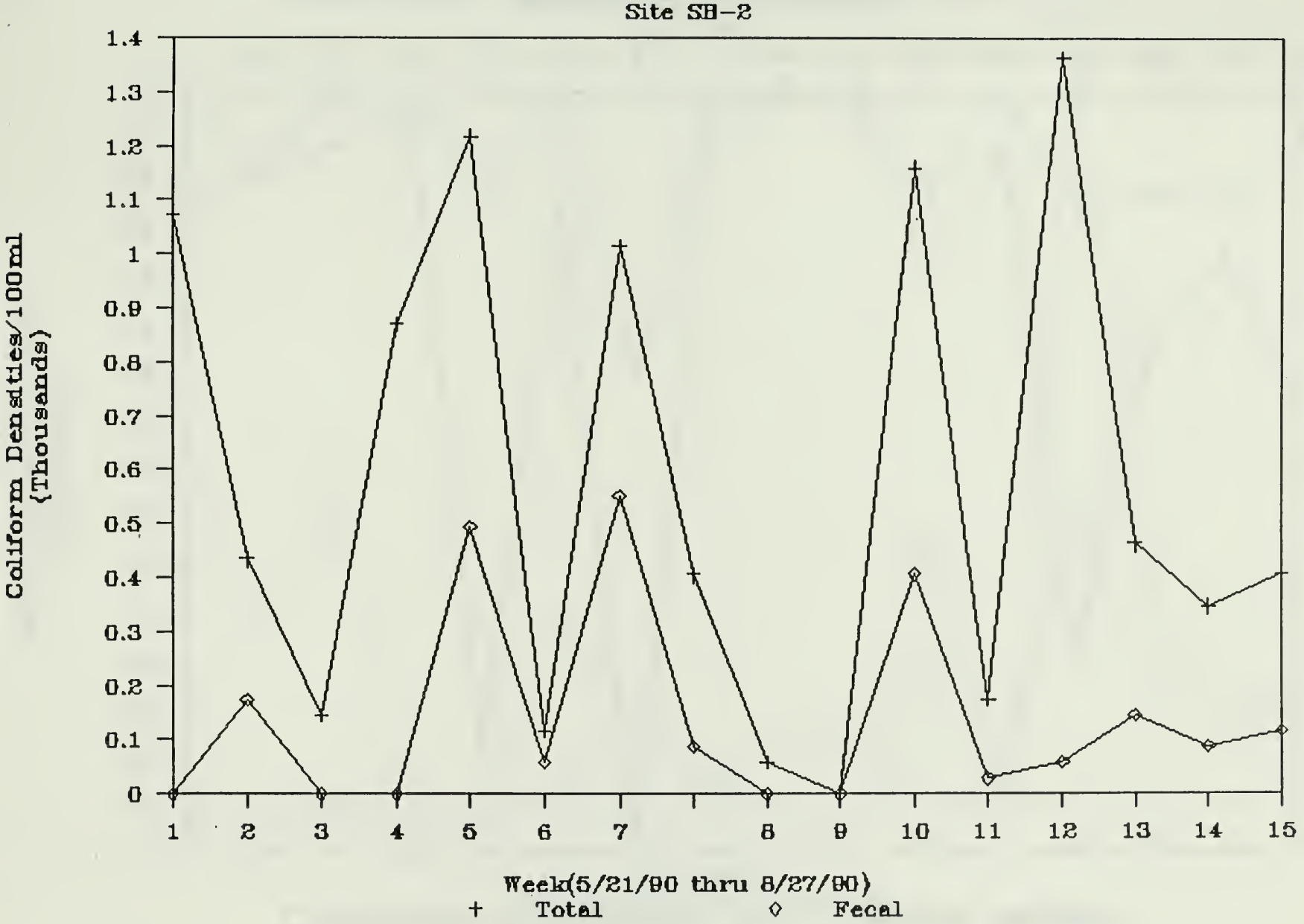
Site NDB-4



Coliform Densities for Staten Island

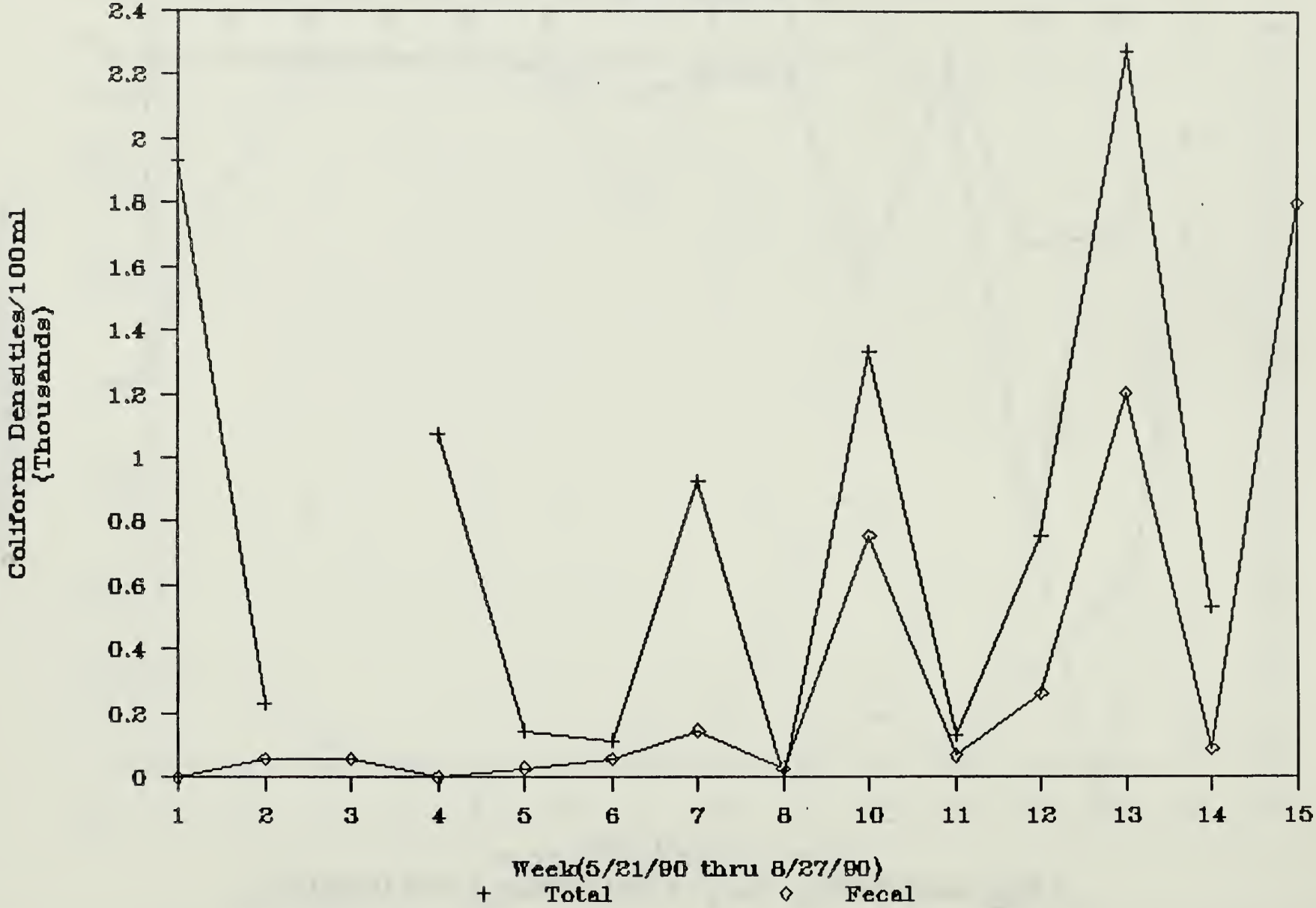


Coliform Densities for Staten Island



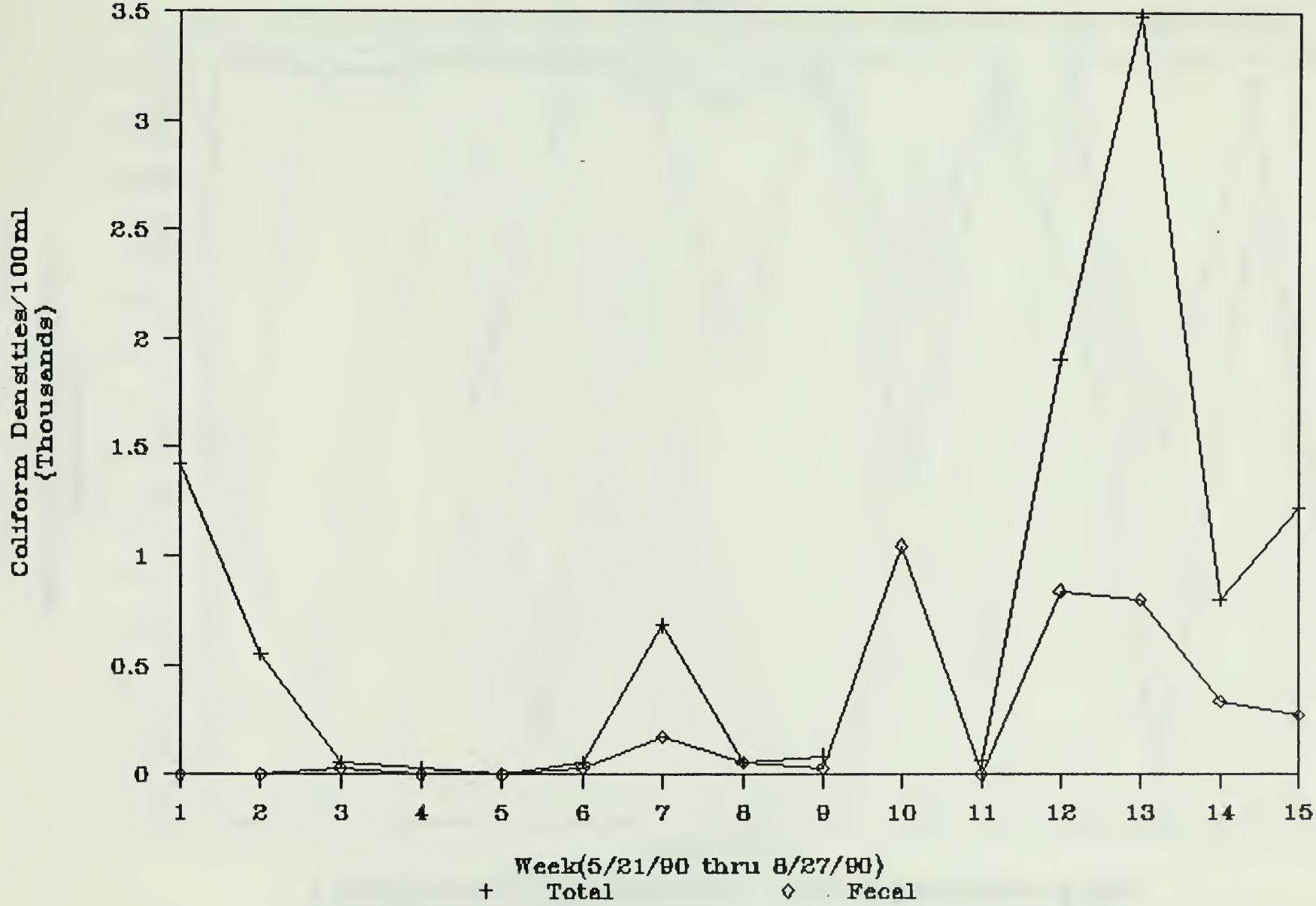
Coliform Densities for Jamaica Bay

Site JB-14



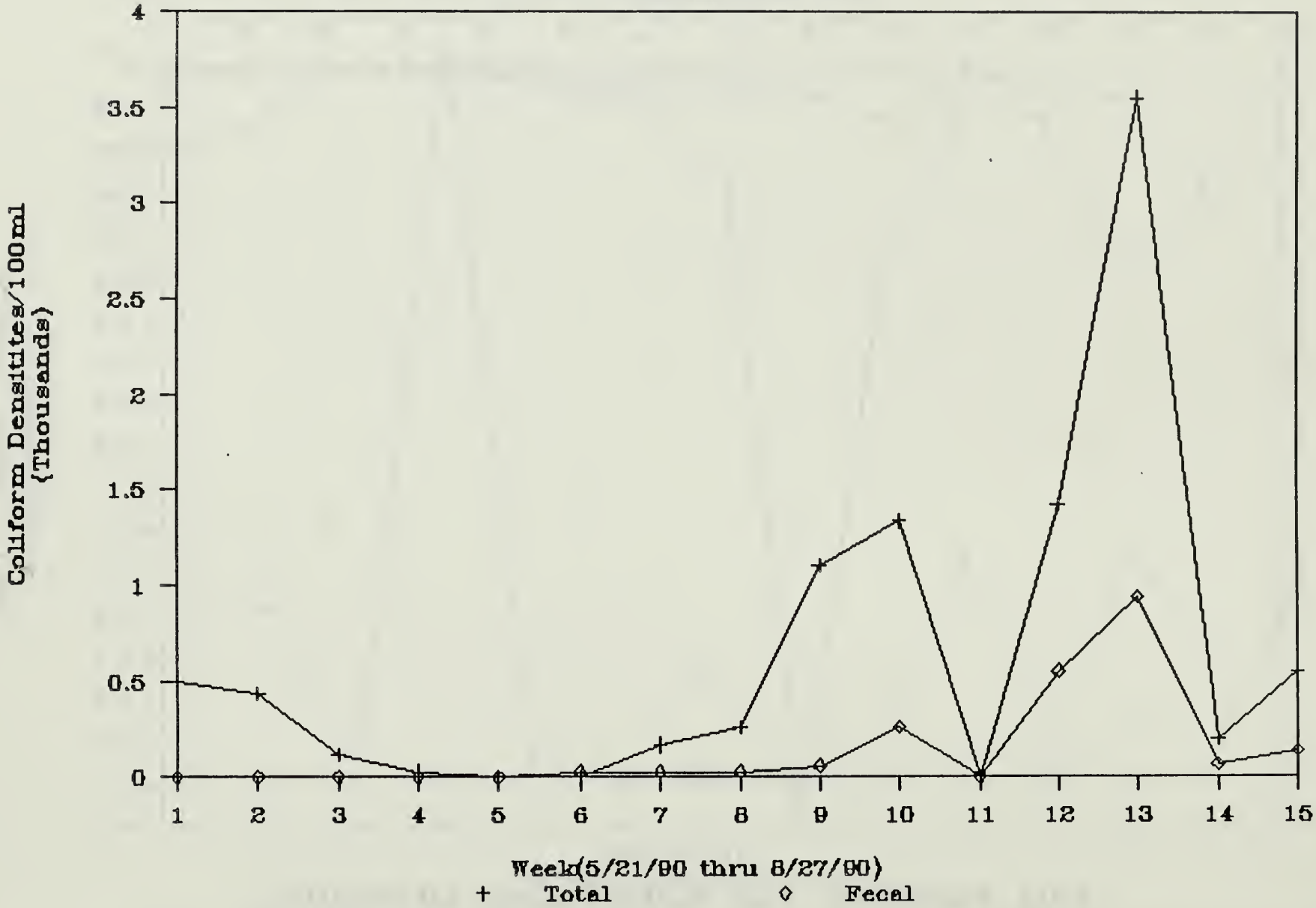
Coliform Densities for Jamaica Bay

Site JB-13



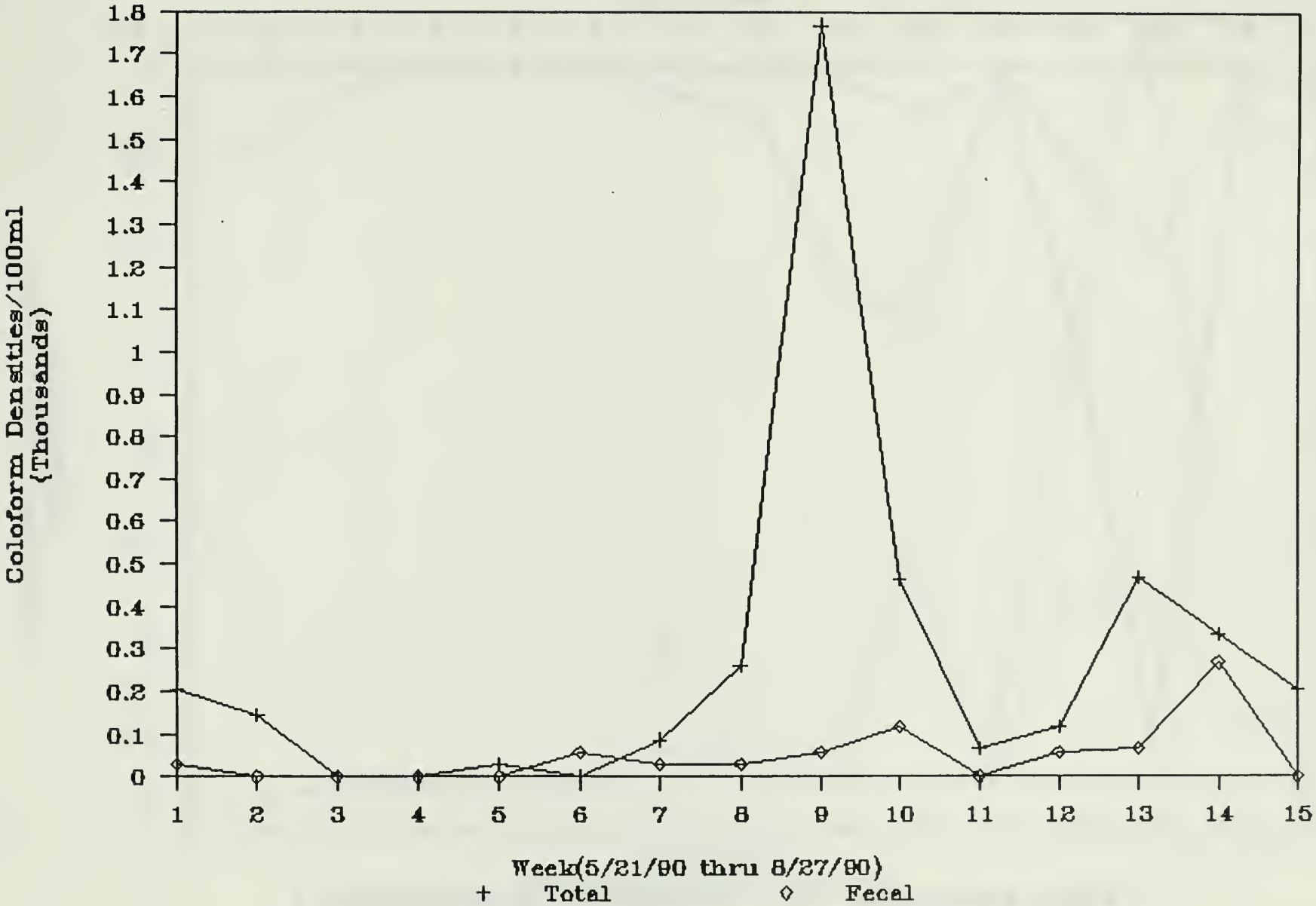
Coliform Densities for Jamaica Bay

Site JB-12



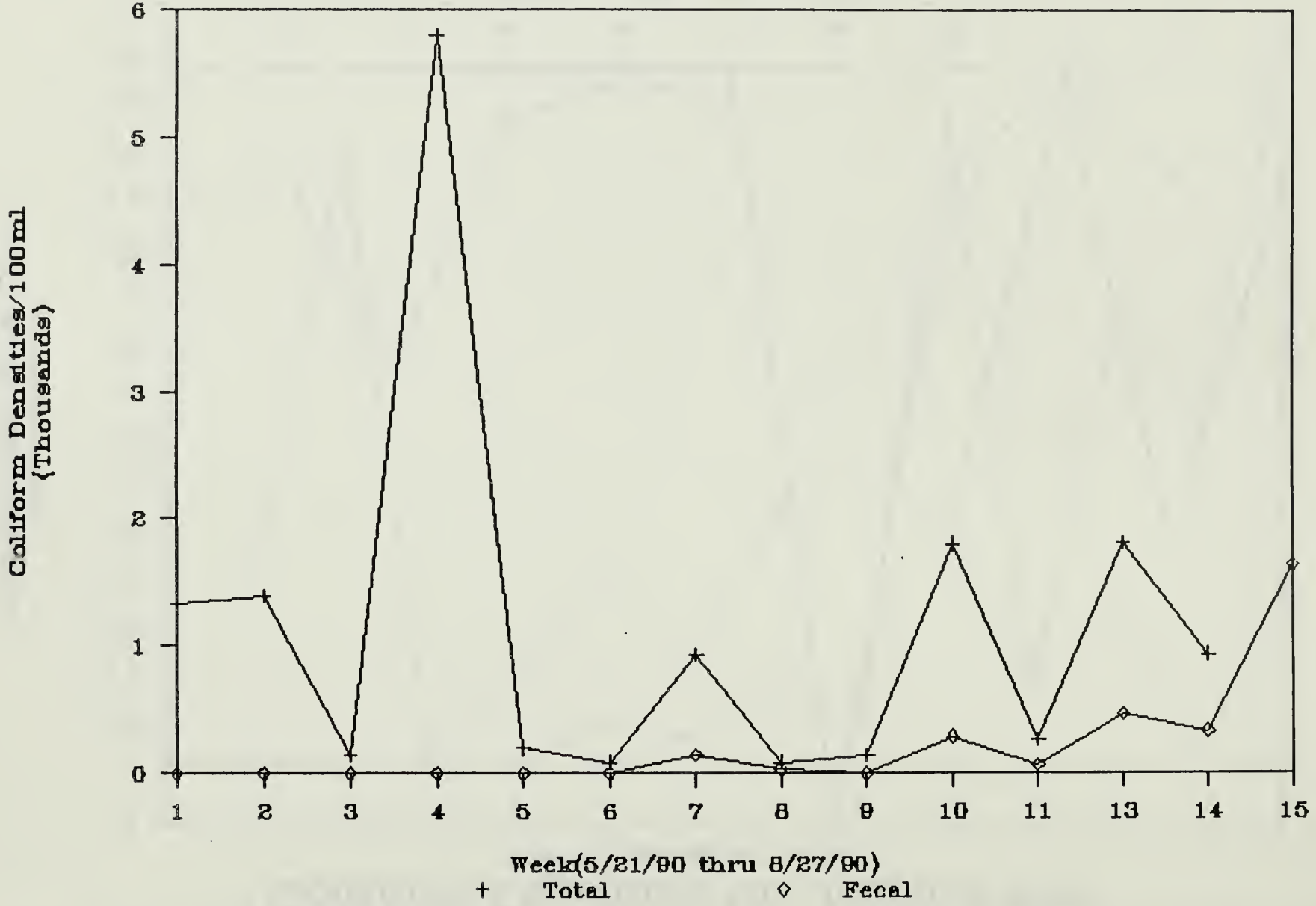
Coliform Densitites for Jamaica Bay

Site JB-11

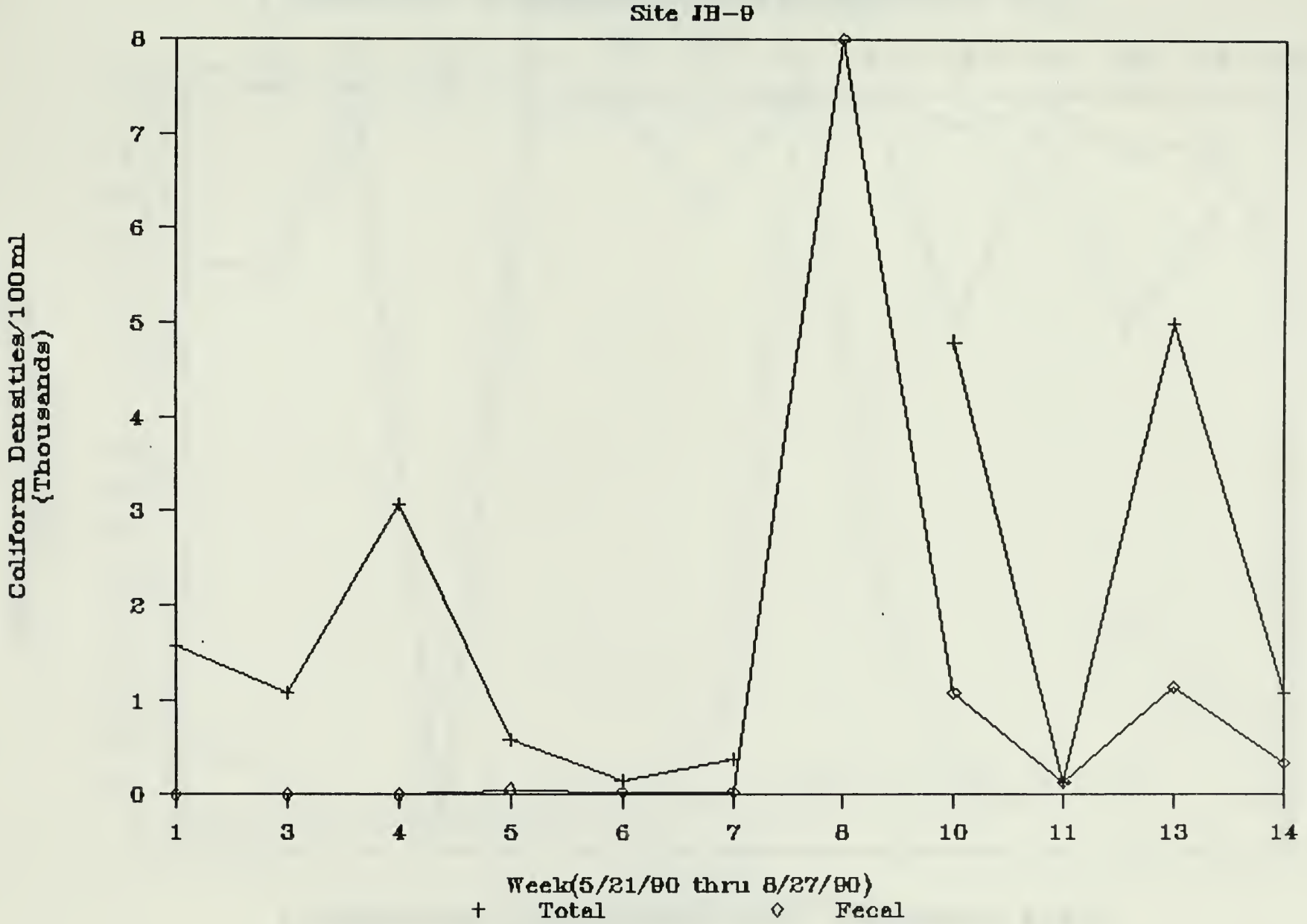


Coliform Densities for Jamiaca Bay

Site JB-10

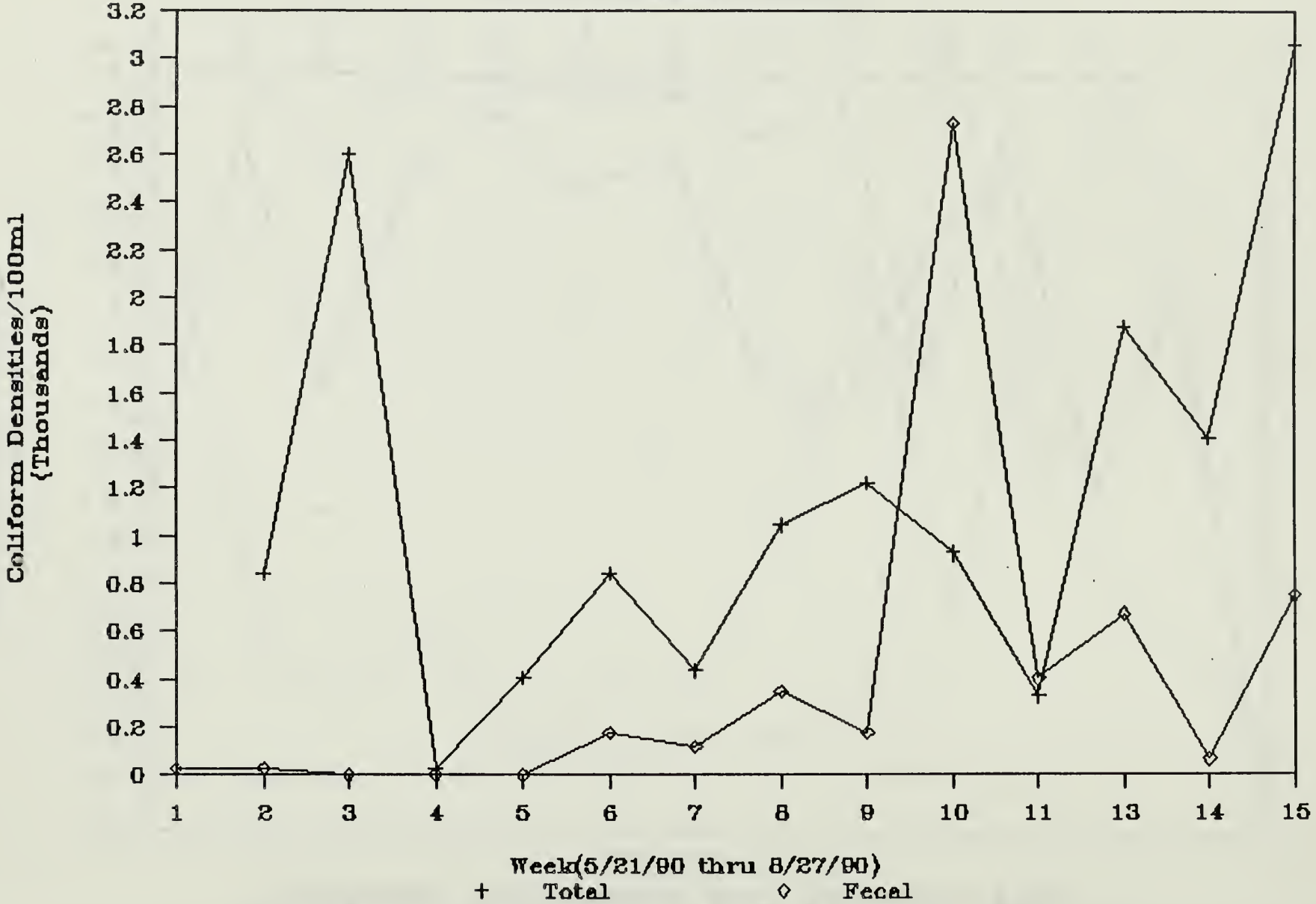


Coliform Densities for Jamaica Bay



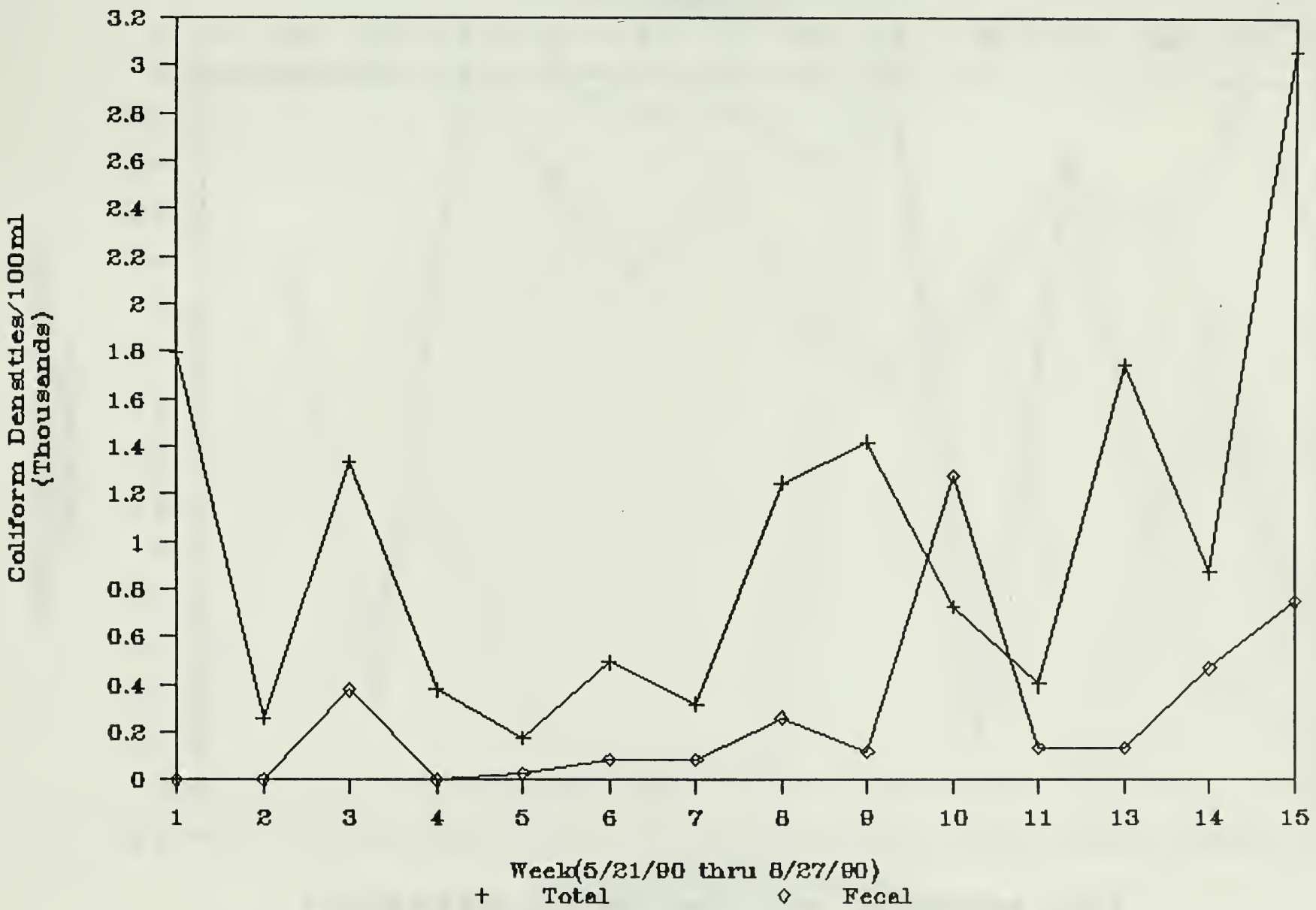
Coliform Densities for Jamaica Bay

Site JB-8



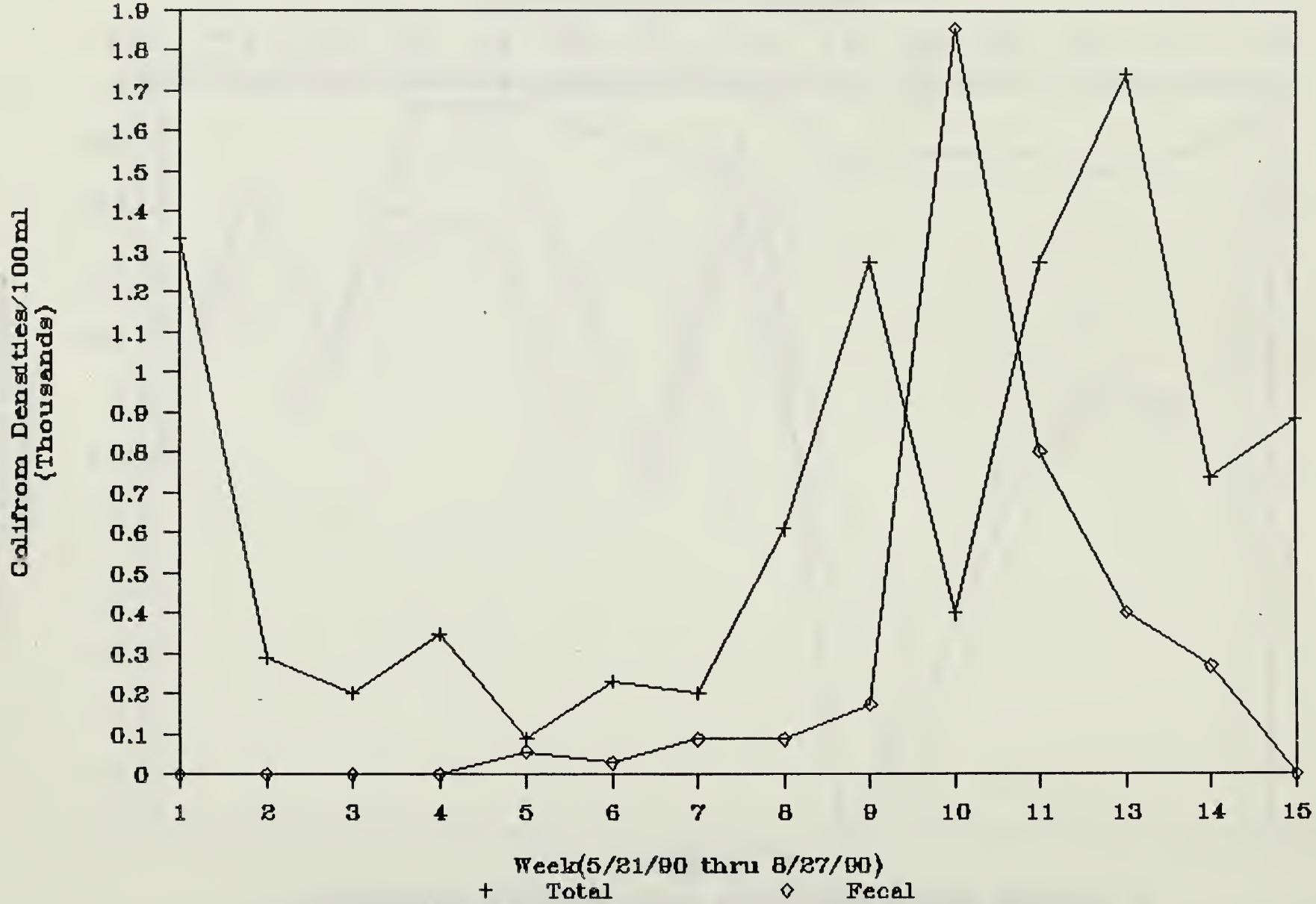
Coliform Densities for Jamaica Bay

Site JB-7



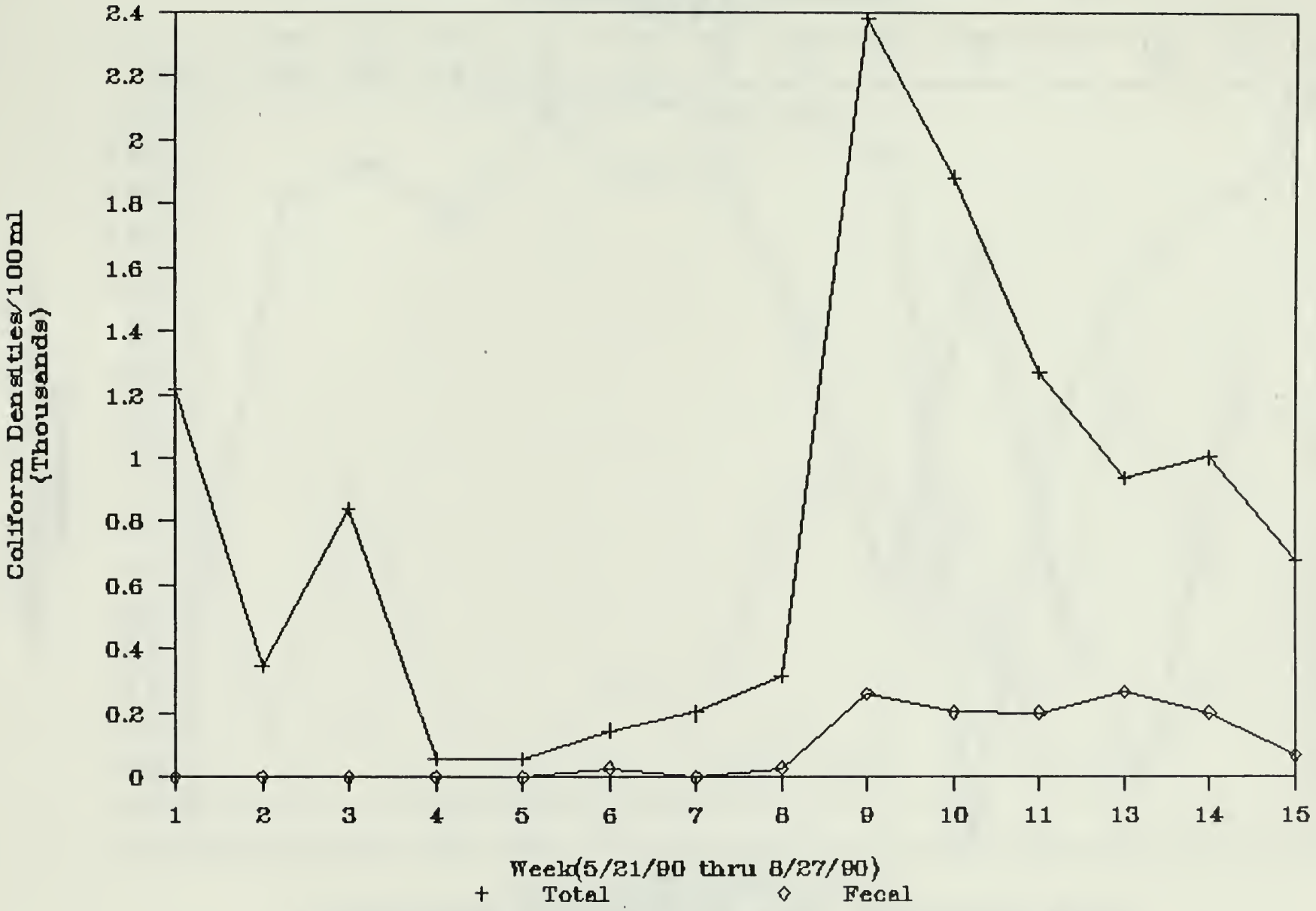
Coliform Densities for Jamaica Bay

Site JB-6A



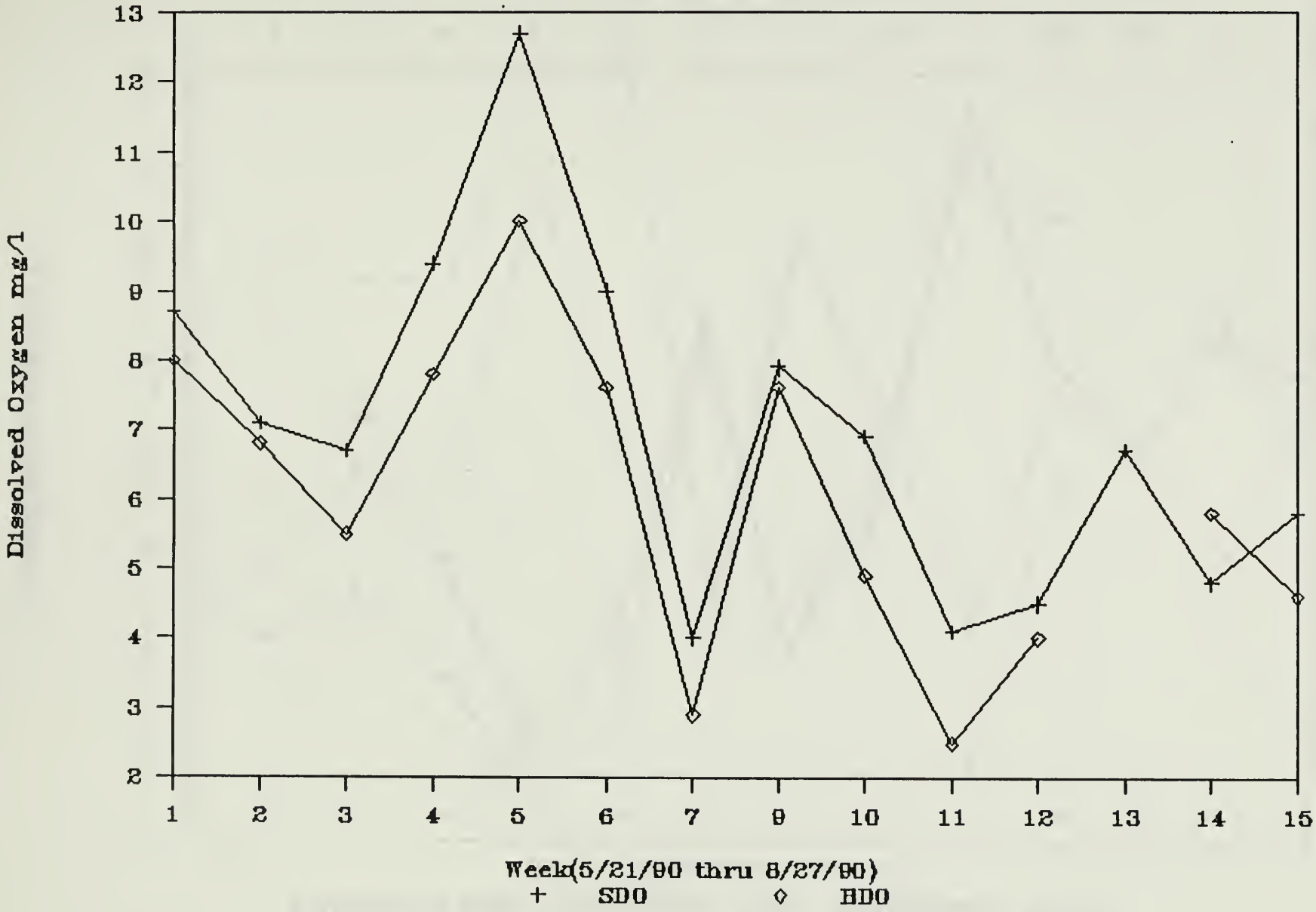
Coliform Densities for Jamaica Bay

Site JB-6



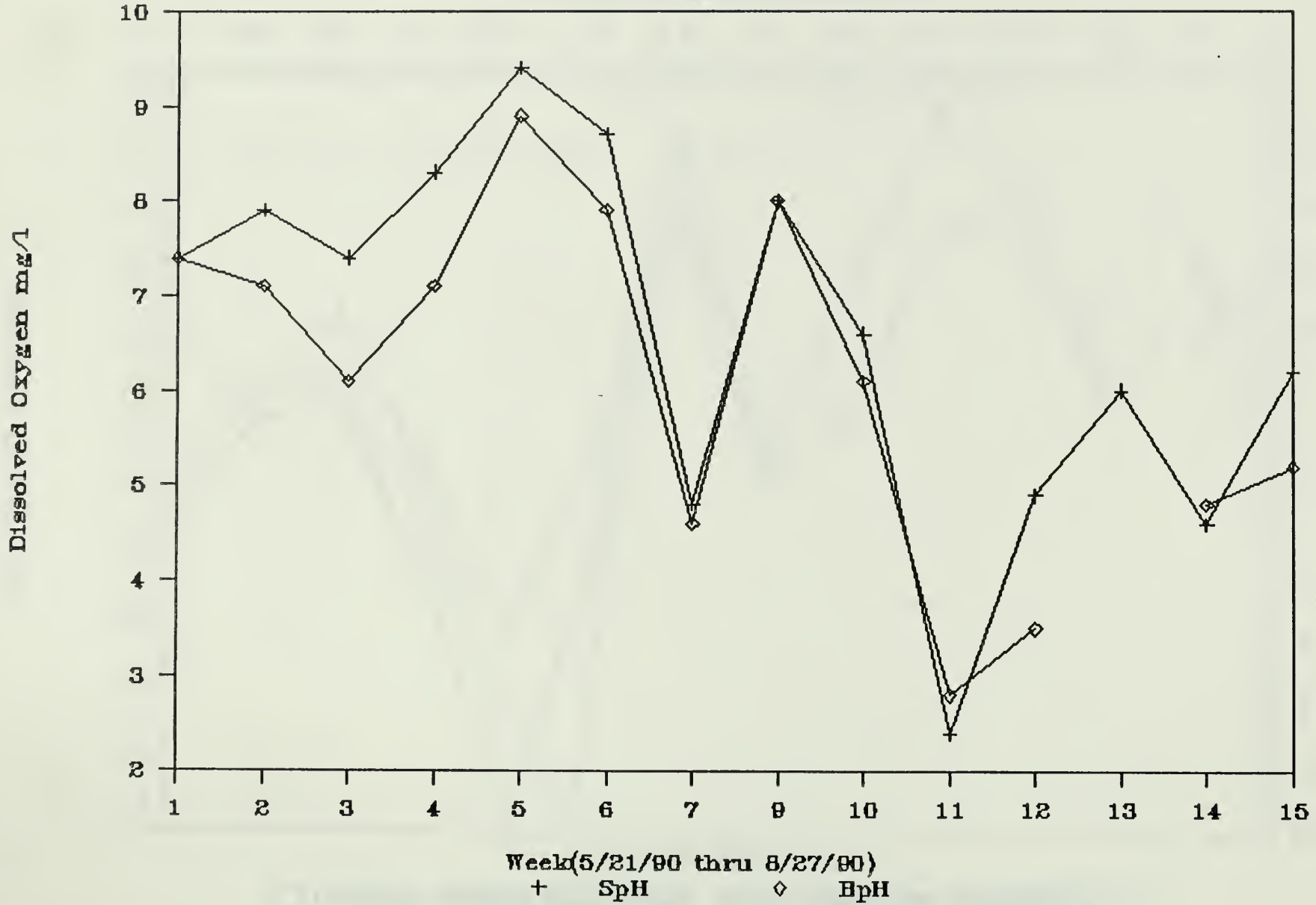
Dissolved Oxygen for Jamaica Bay

Site JB-6A



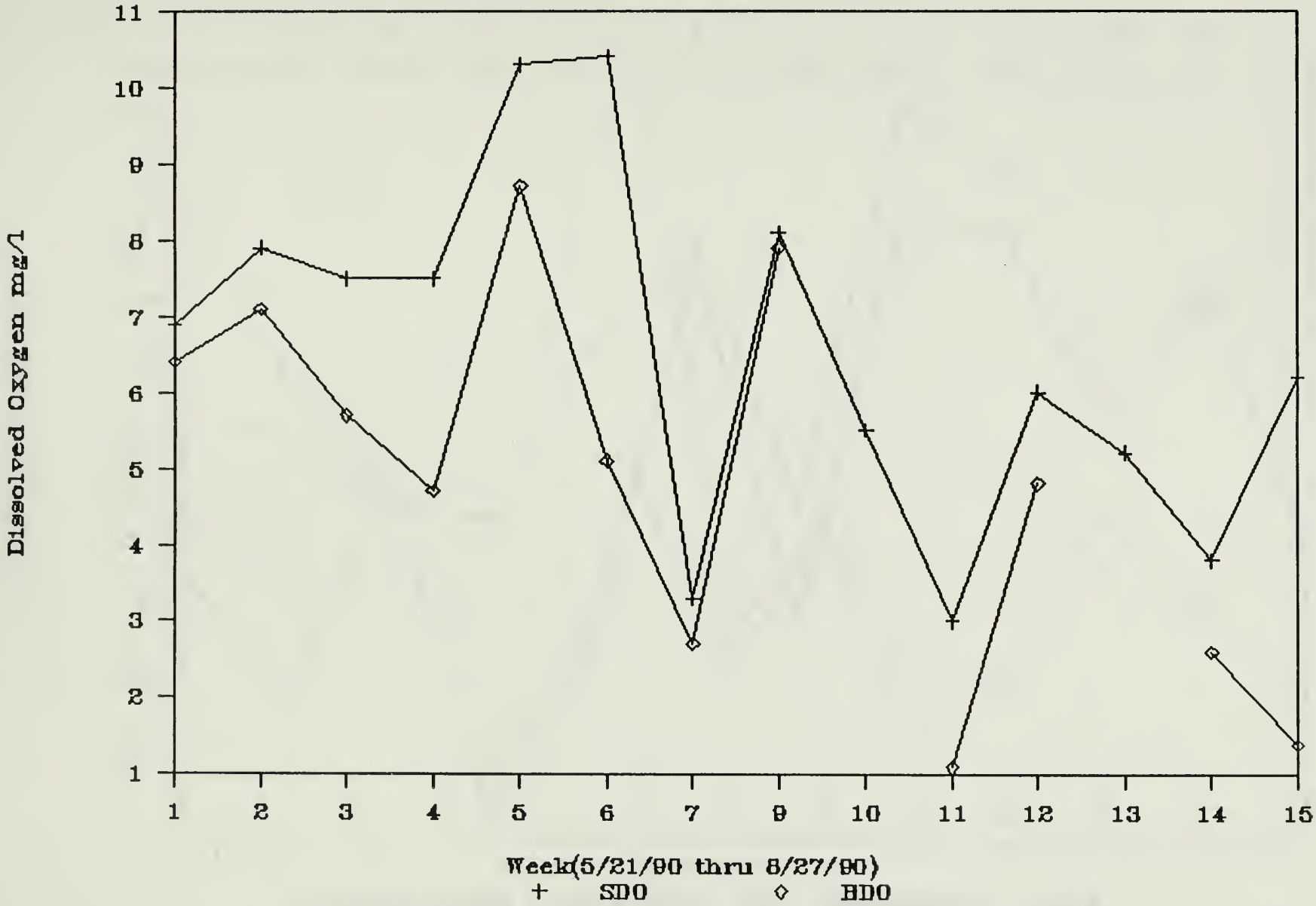
Dissolved Oxygen for Jamaica Bay

Site JB-7



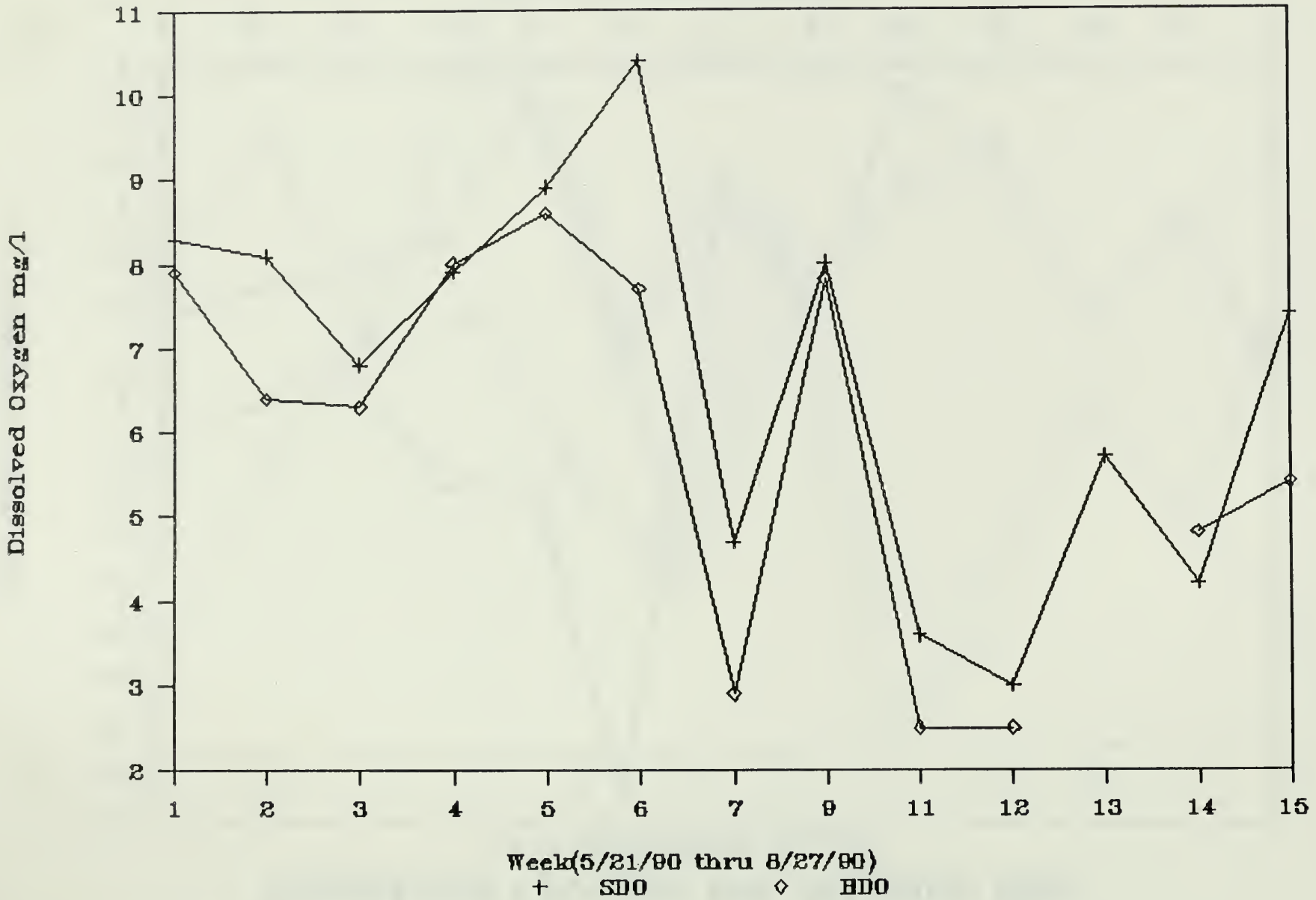
Dissolved Oxygen for Jamaica Bay

Site JB-8



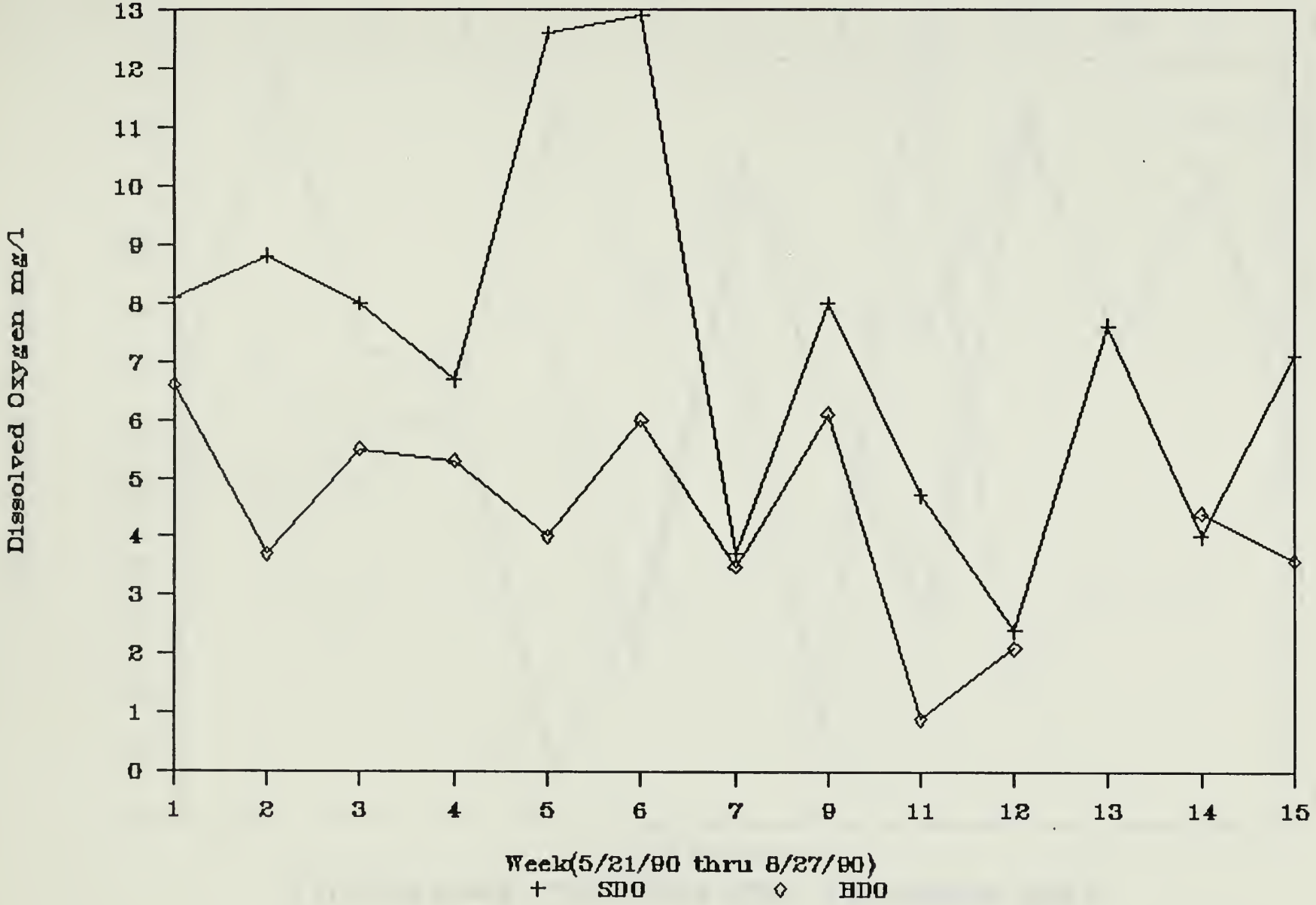
Dissolved Oxygen for Jamaica Bay

Site JB-11



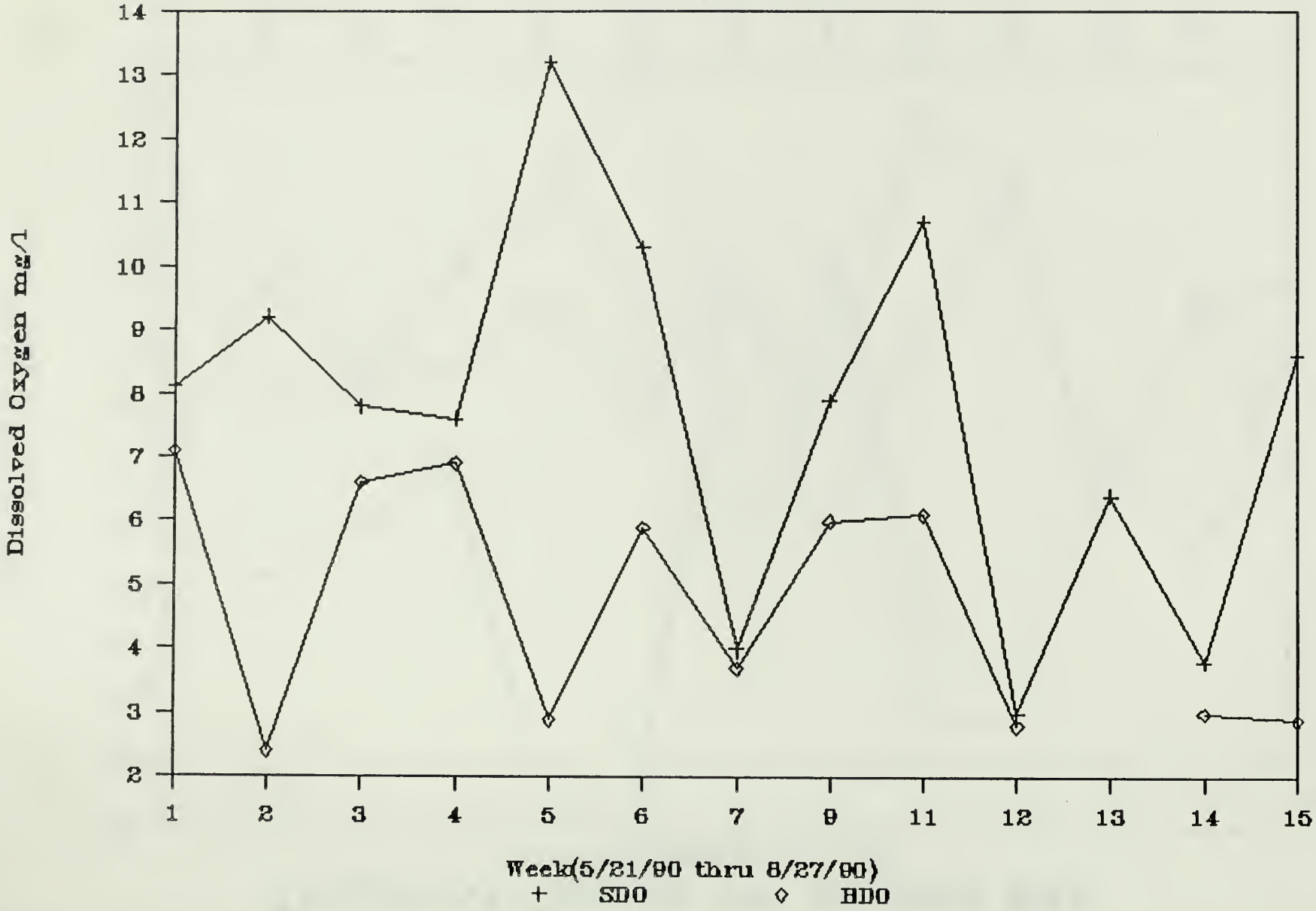
Dissolved Oxygen for Jamaica Bay

Site JB-12



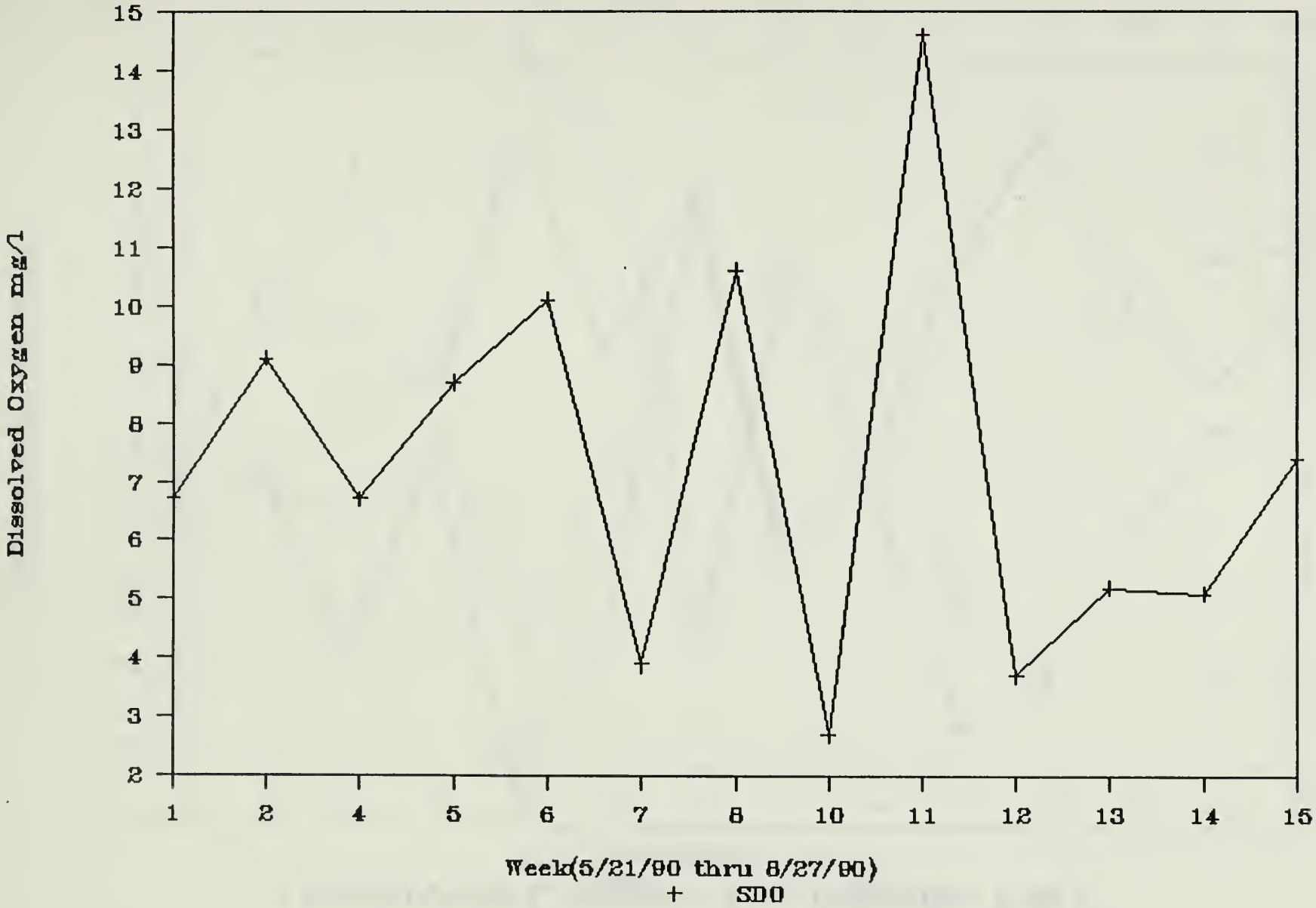
Dissolved Oxygen for Jamaica Bay

Site JB-13



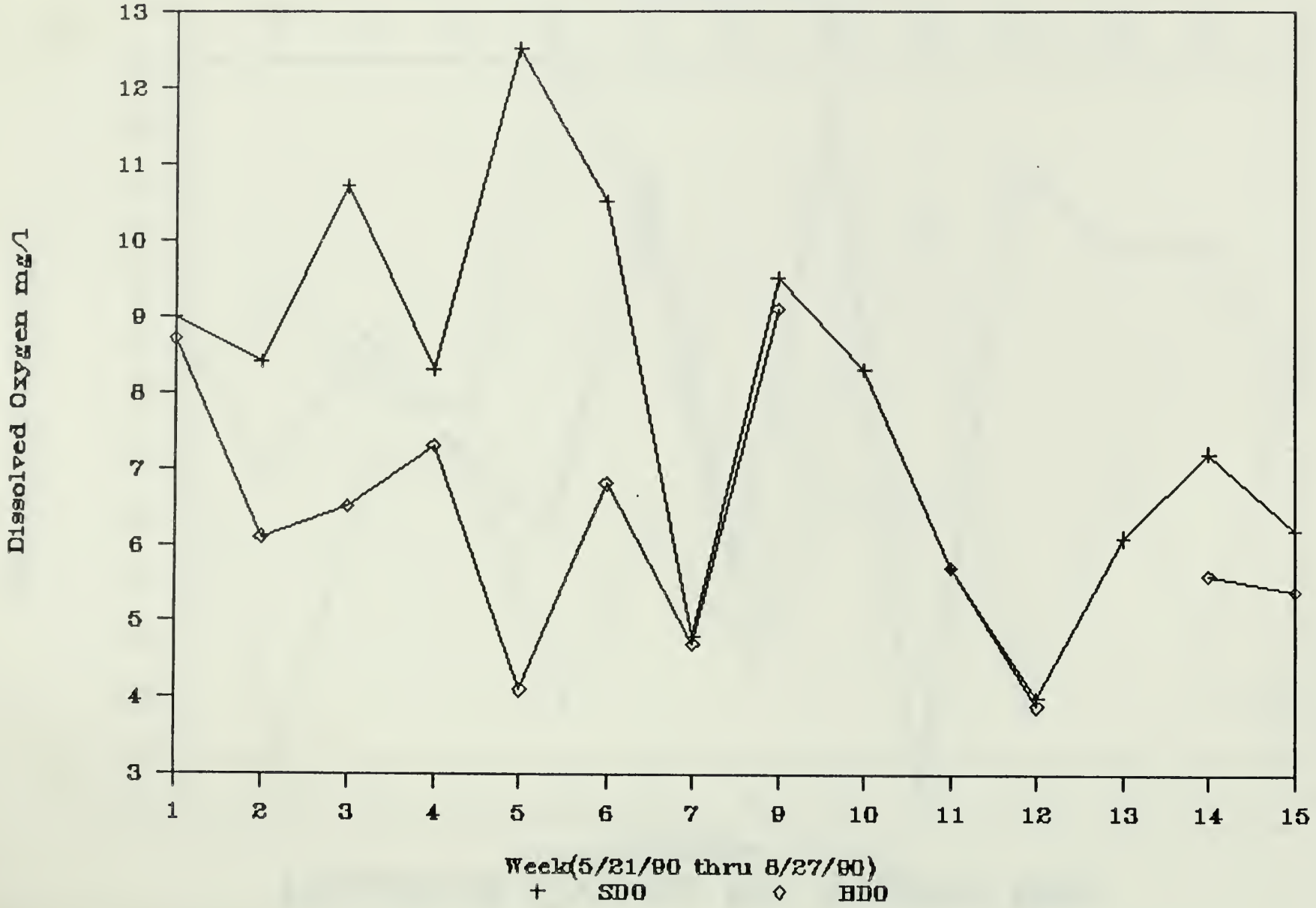
Dissolved Oxygen for Jamaica Bay

Site JB-14



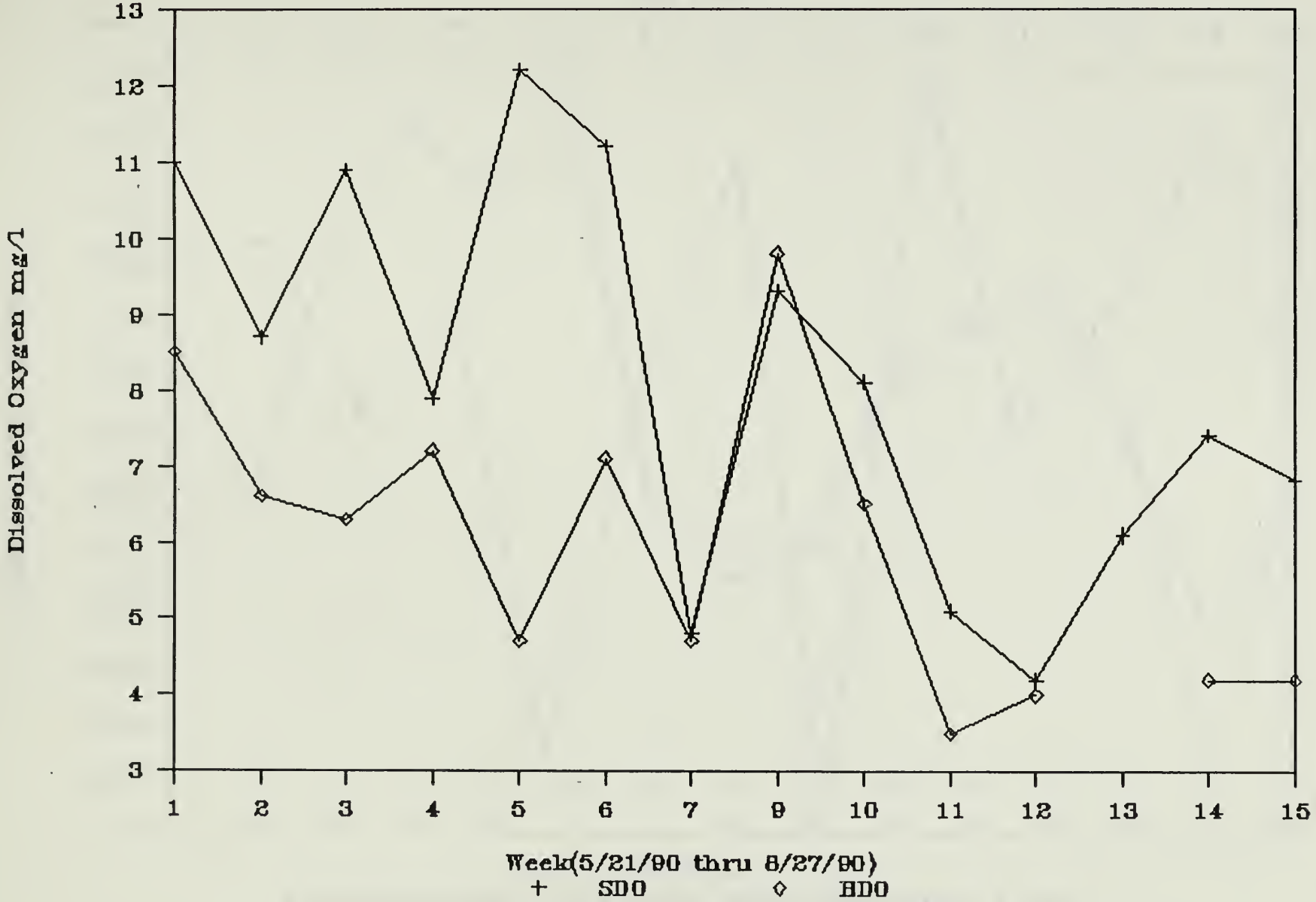
Dissolved Oxygen for Marine Park

Site MP-1



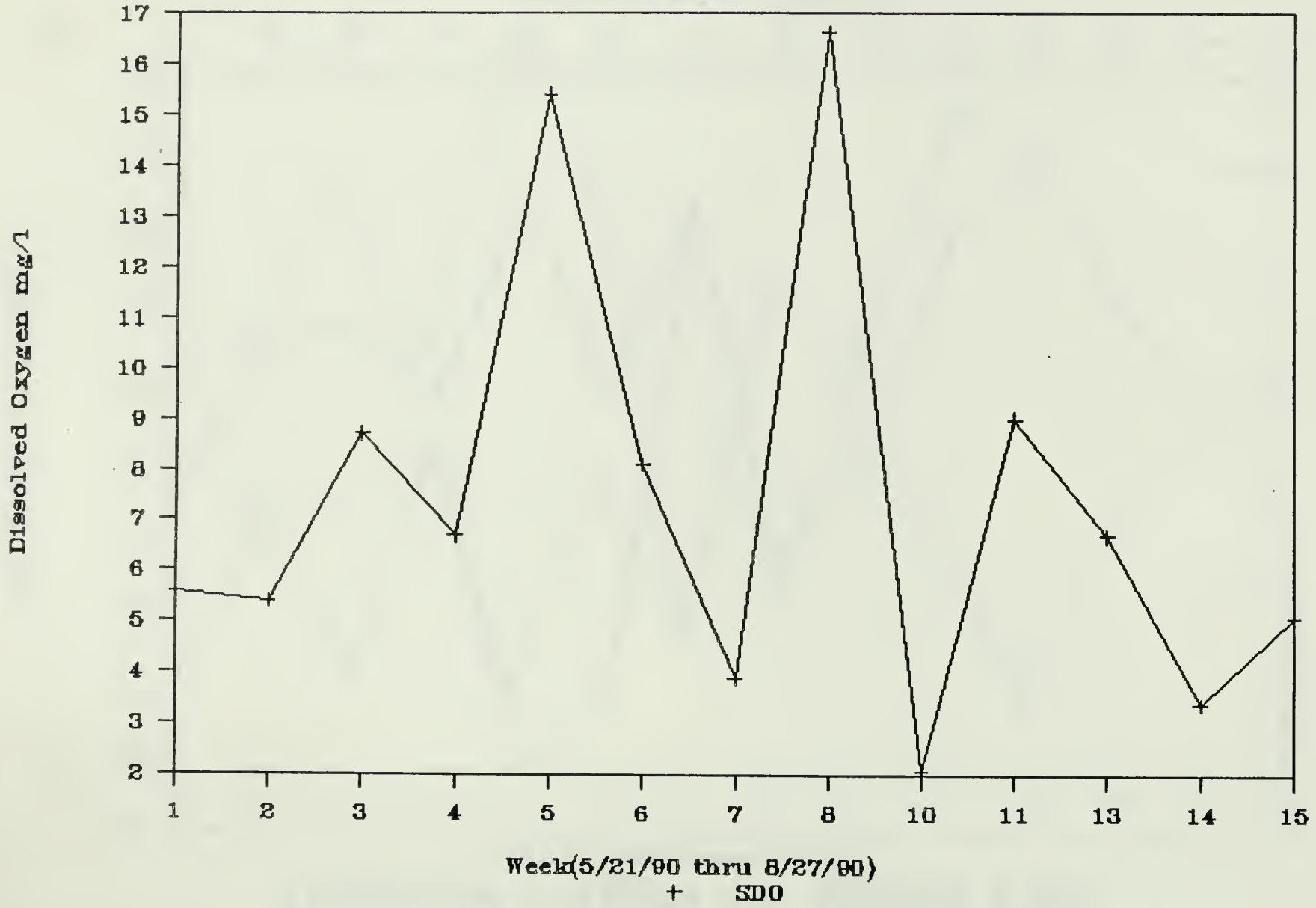
Dissolved Oxygen for Marine Park

Site MP-2



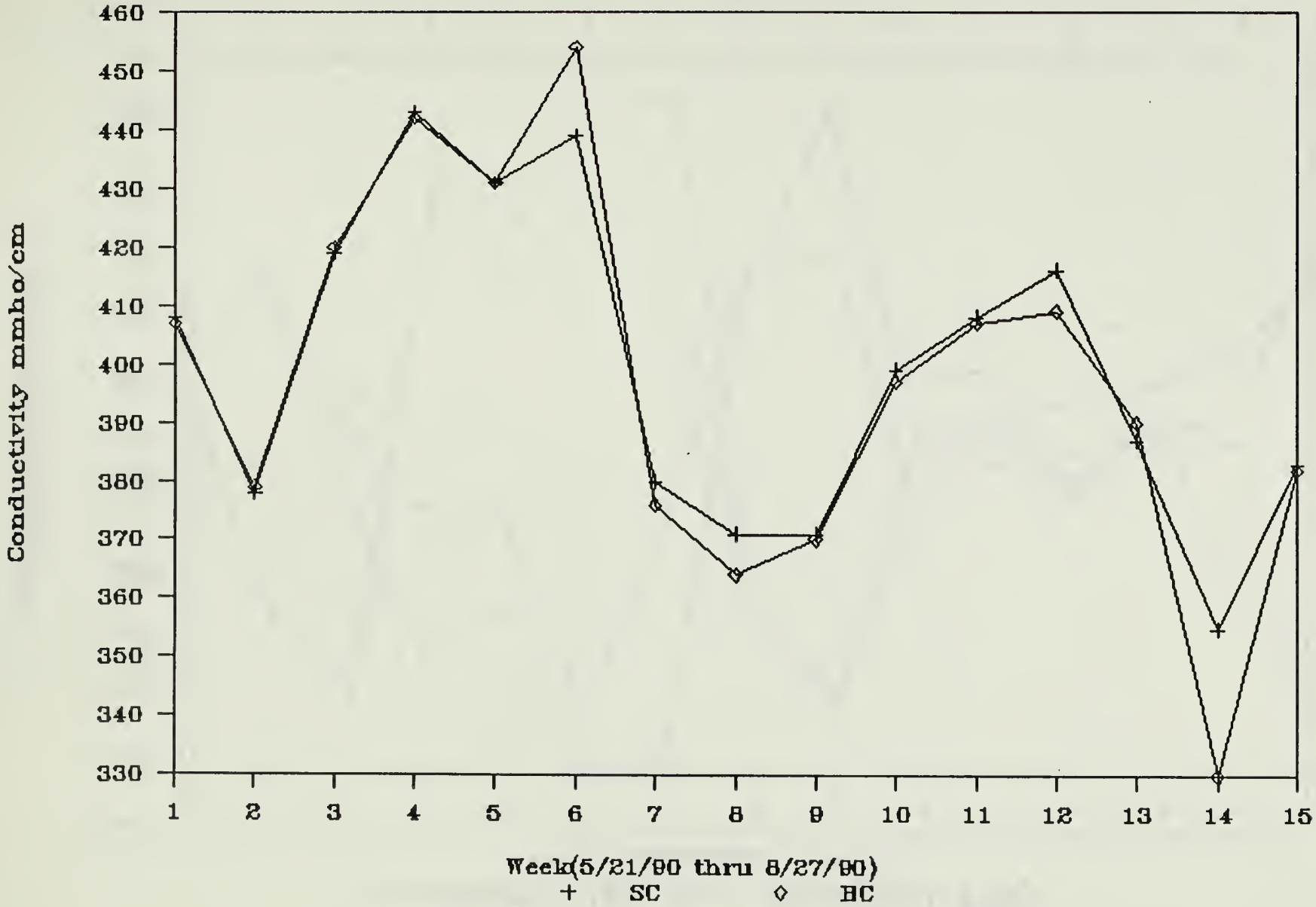
Dissolved Oxygen for Marine Park

Site MP-3



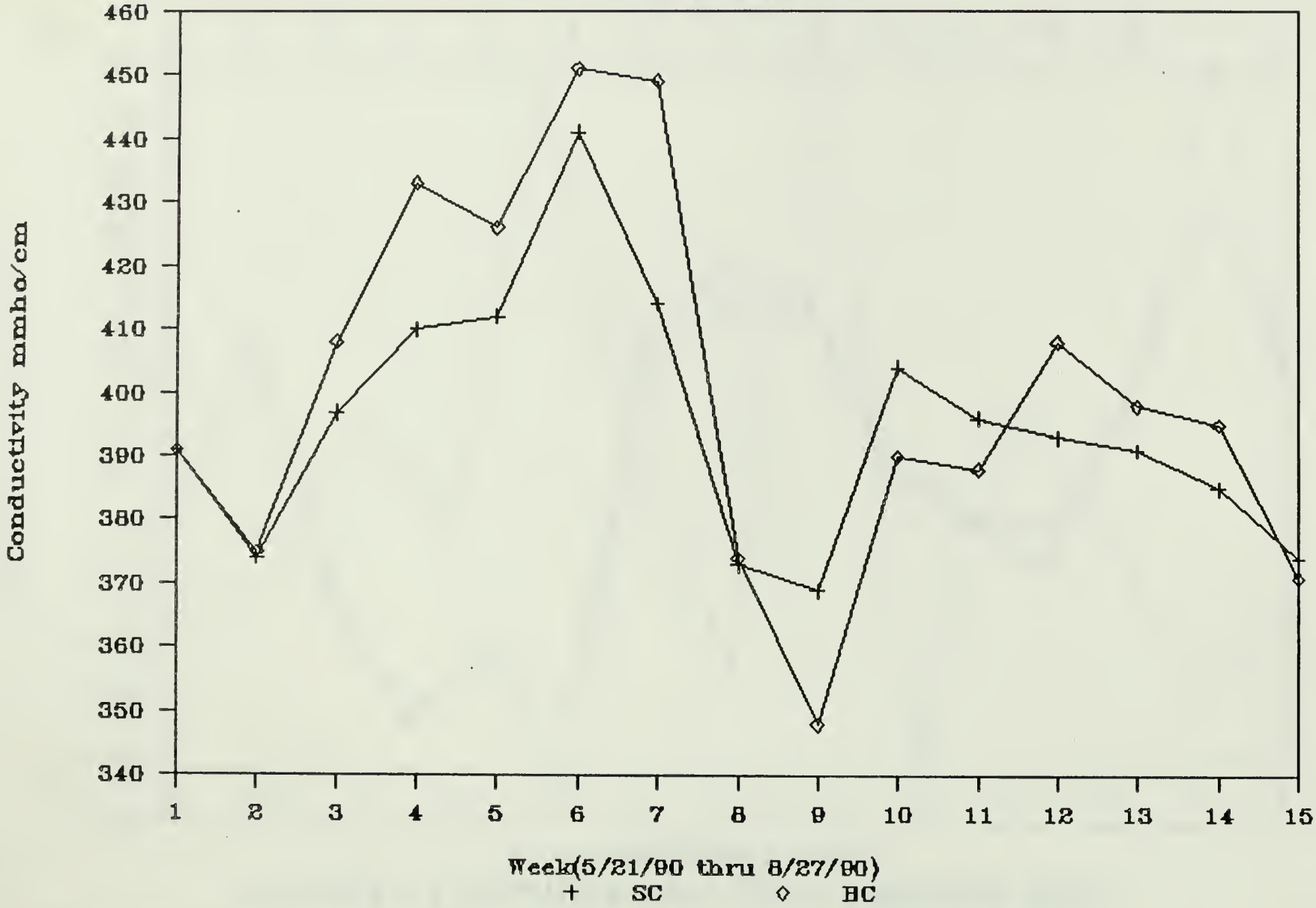
Weekly Conductivity for Jamaica Bay

Site RI-3



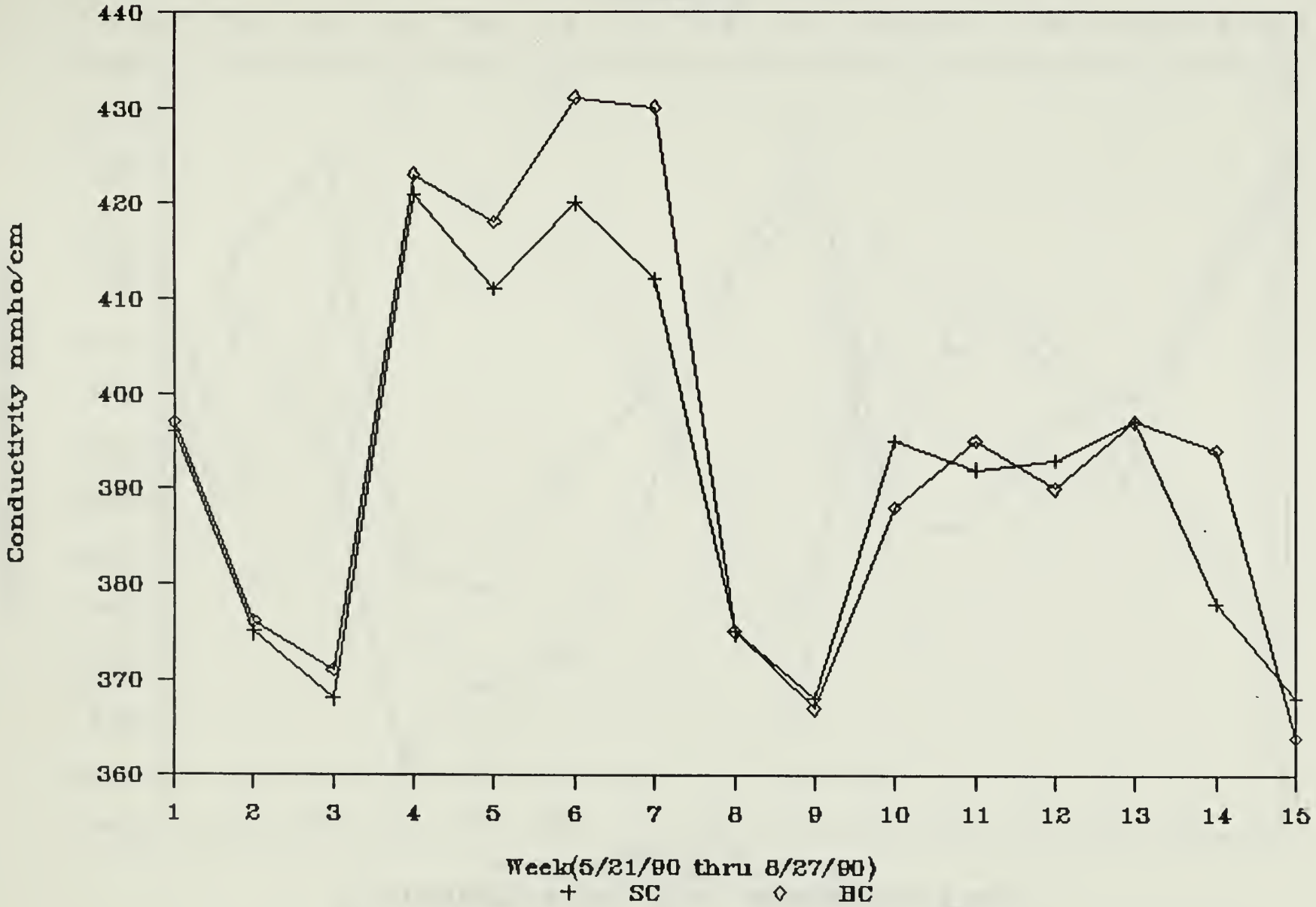
Conductivity for Jamaica Bay

Site MPB-4



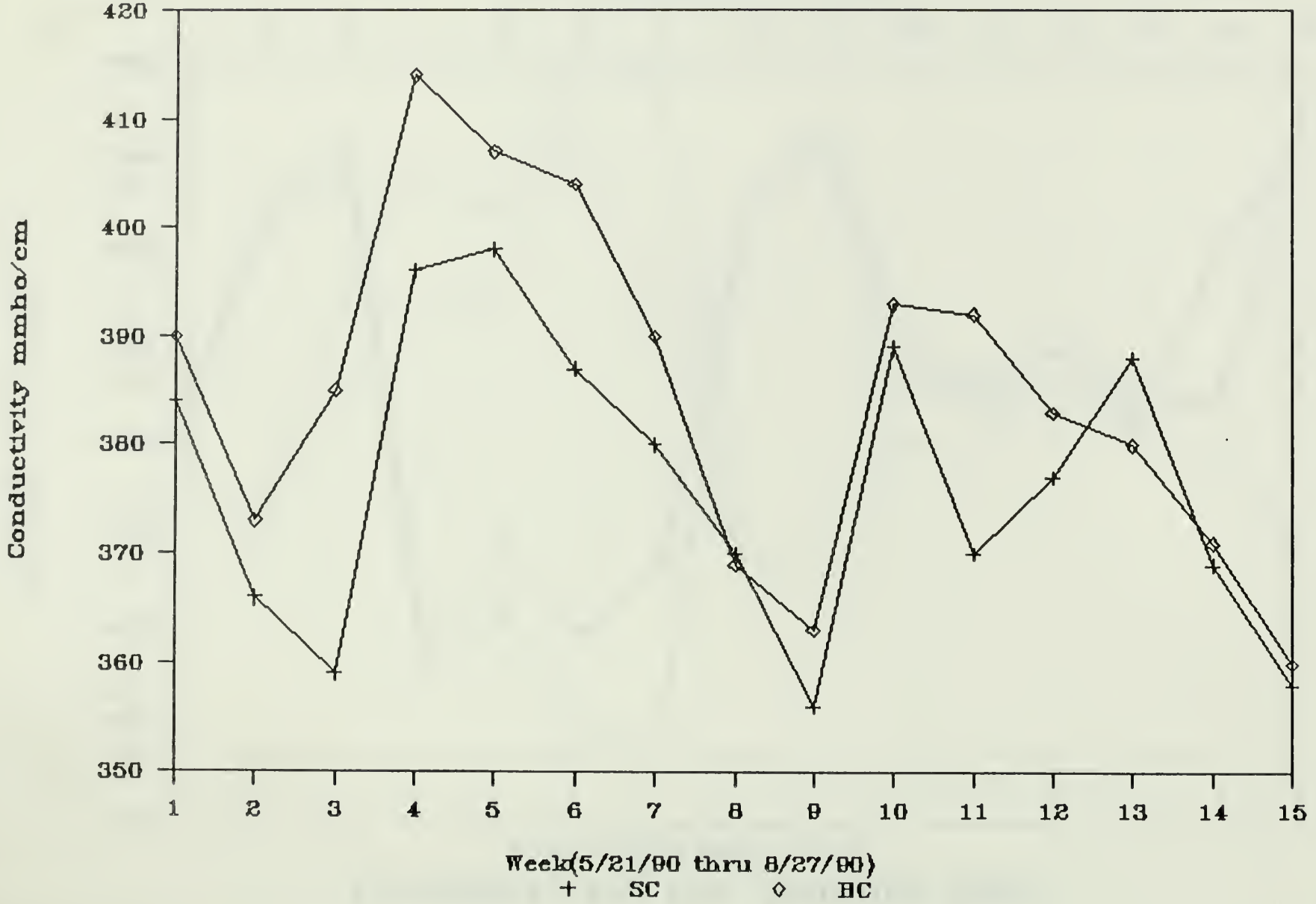
Conductivity for Jamaica Bay

Site JB-5



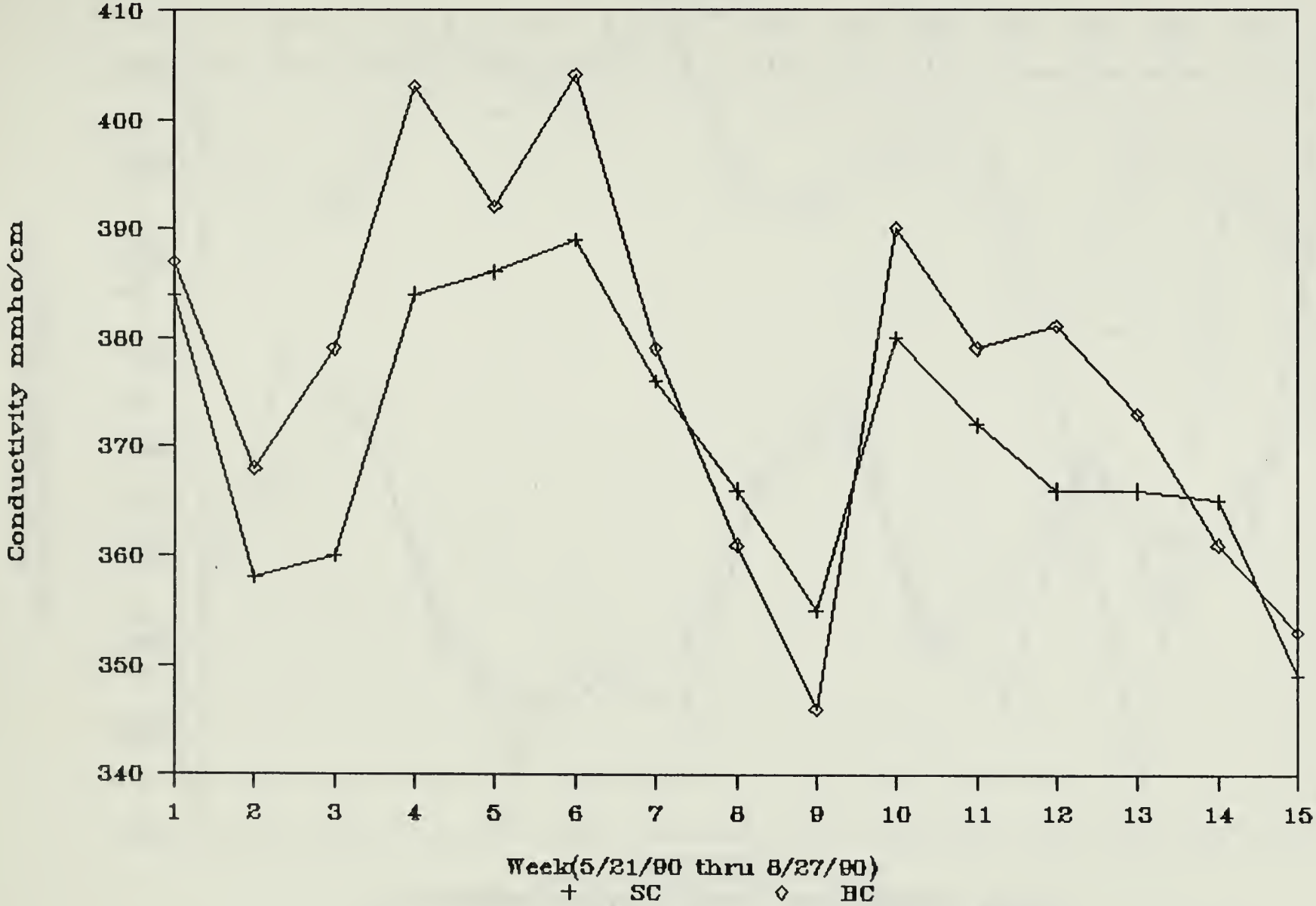
Conductivity for Jamaica Bay

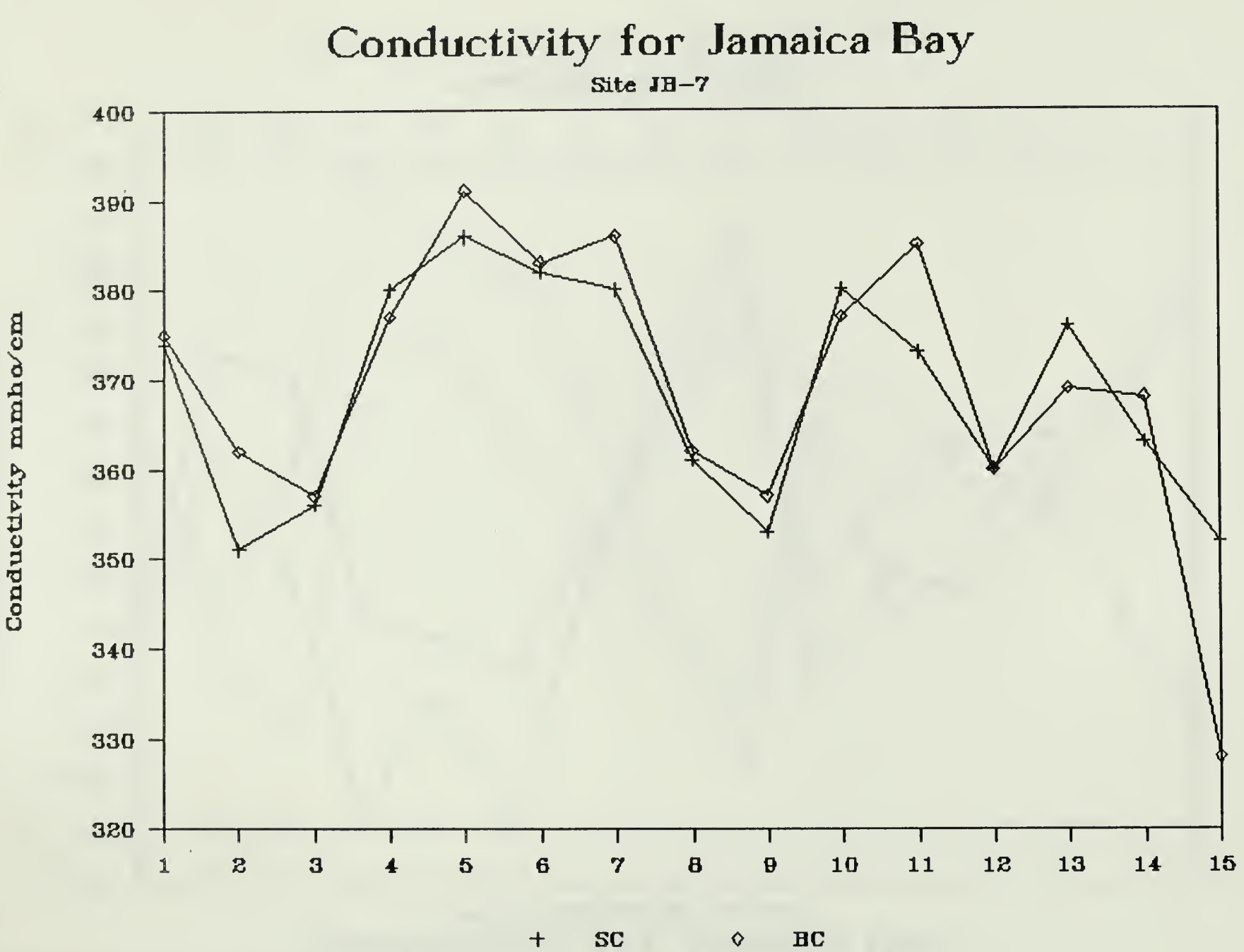
Site JB-6



Conductivity for Jamaica Bay

Site JB-6A




Conductivity for Jamaica Bay
Site JB-7
Conductivity mmho/cm
400
390
380
370
360
350
340
330
320
1
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10
11
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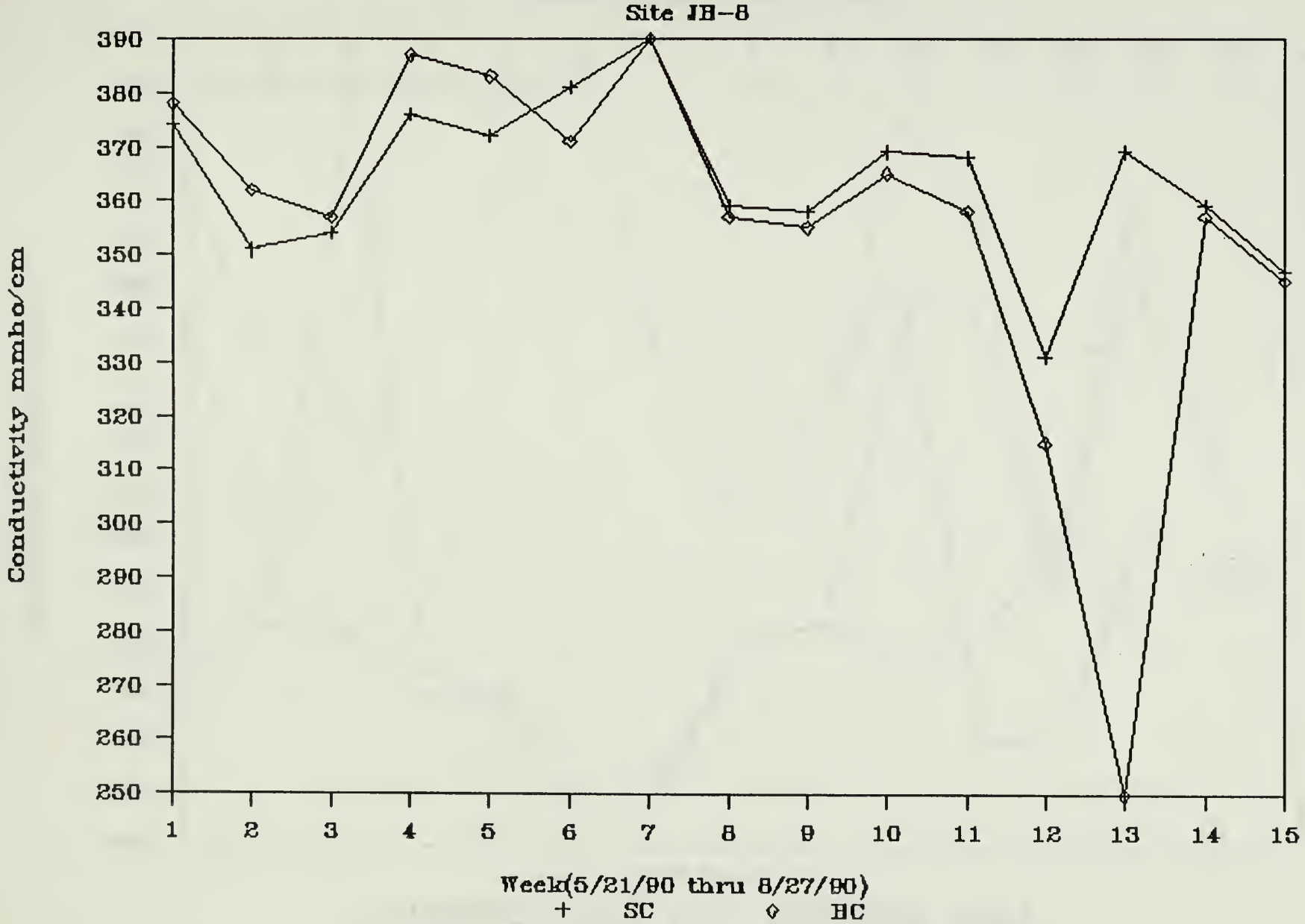
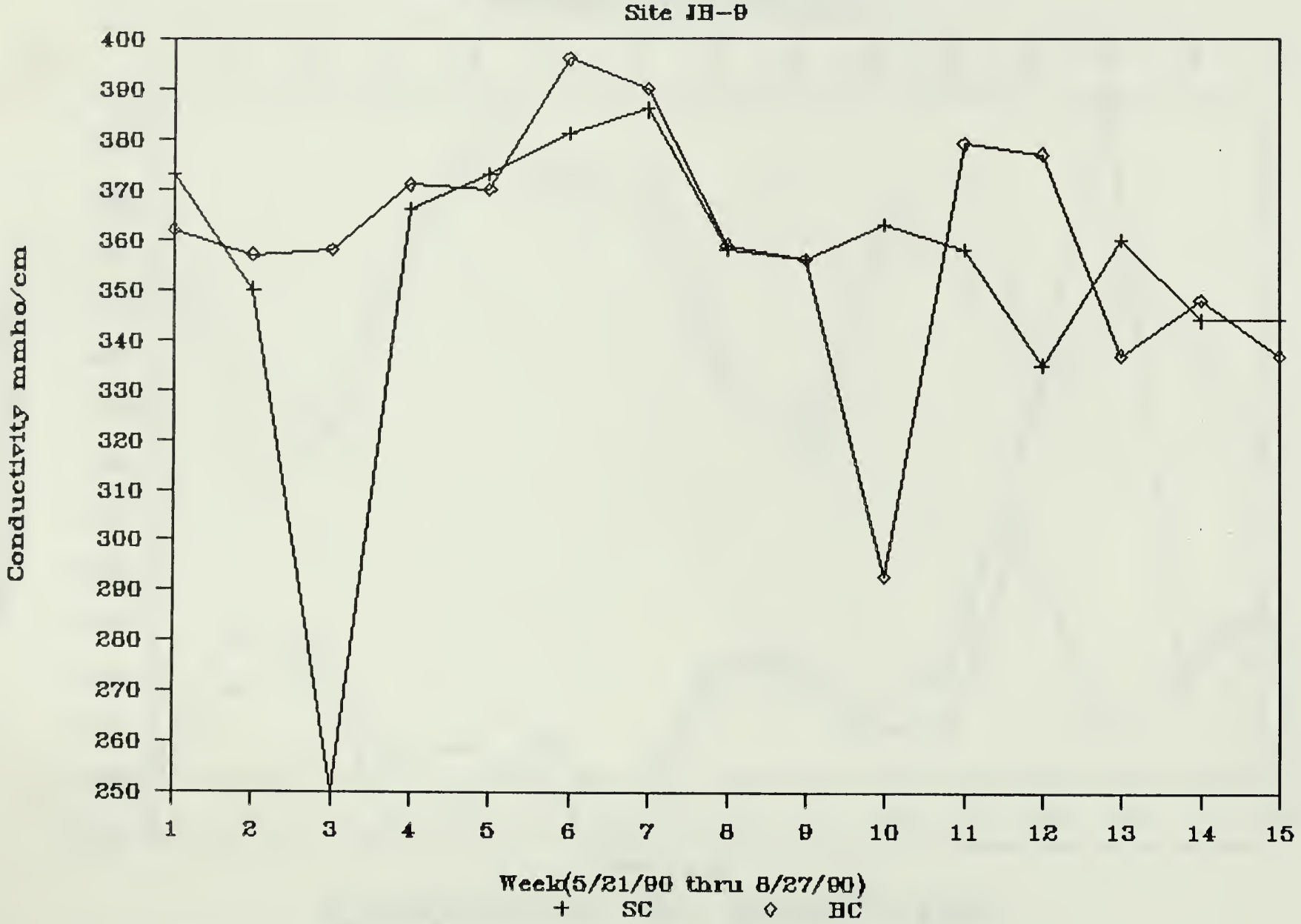
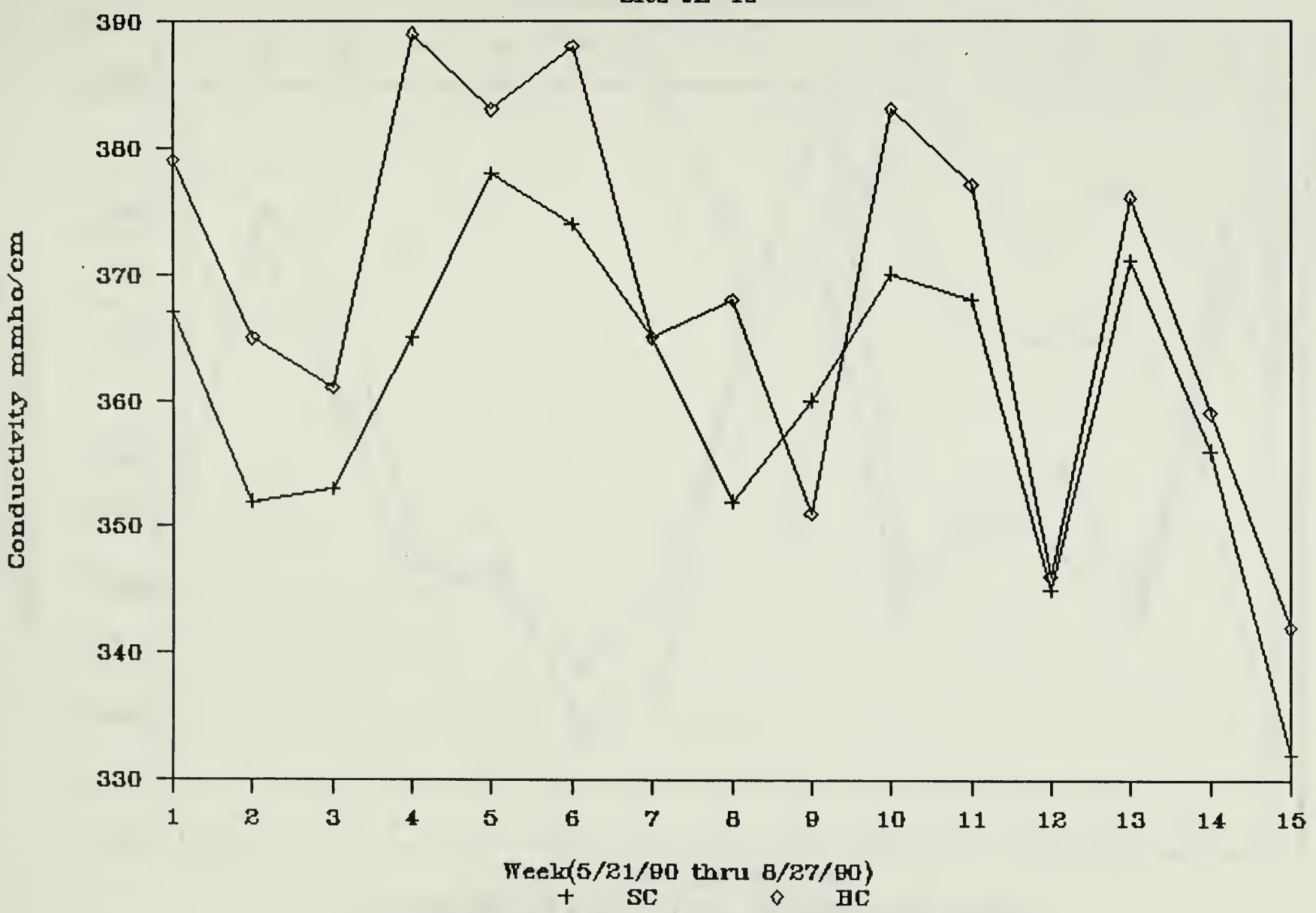
13
14
15
+ SC
◇ BC

Conductivity for Jamaica Bay



Conductivity for Jamaica Bay




Conductivity for Jamaica Bay
Site JB-10
Conductivity mmho/cm
390
380
370
360
350
340
330
1
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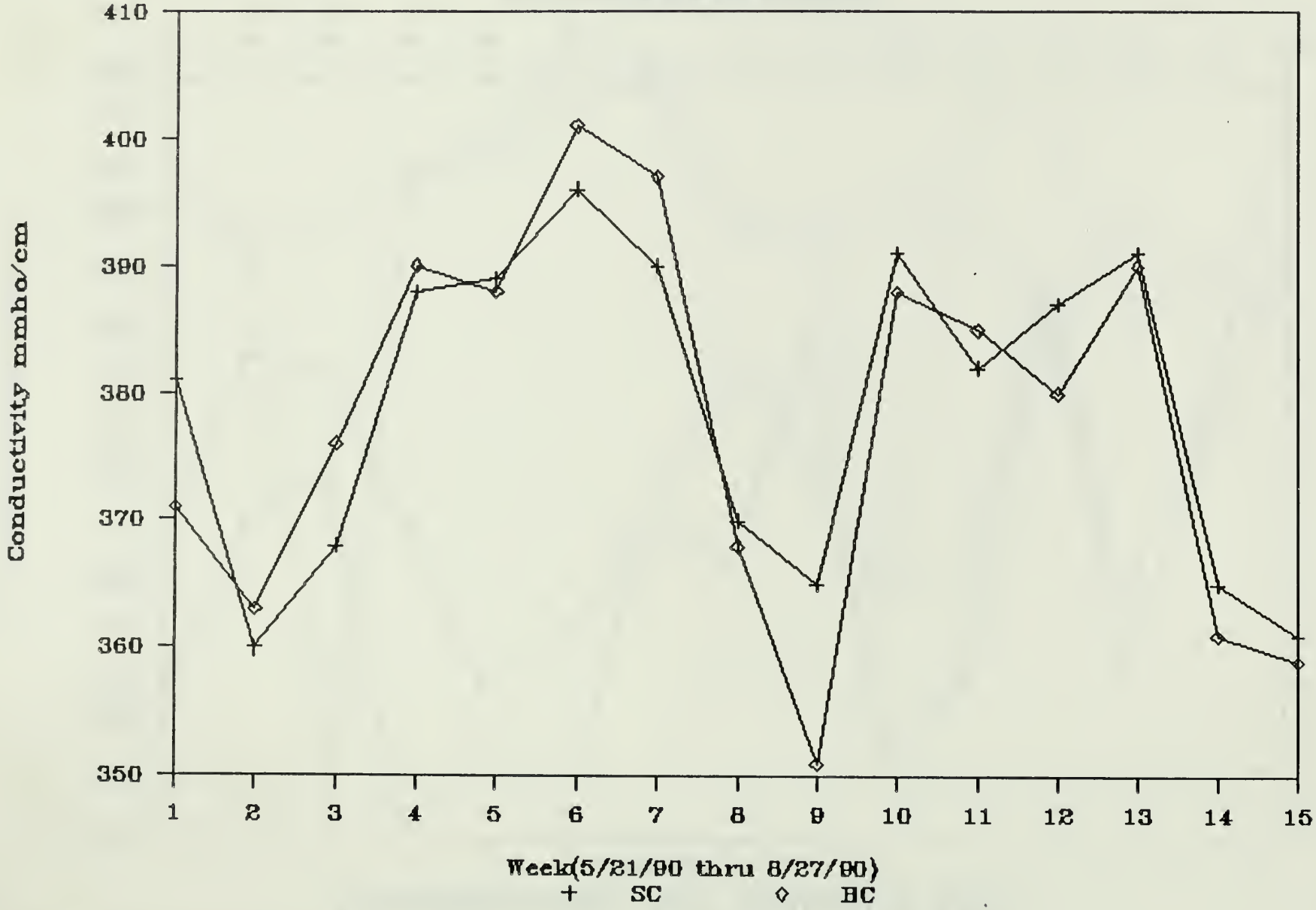
14
15
Week(5/21/90 thru 8/27/90)
+ SC
◇ HC

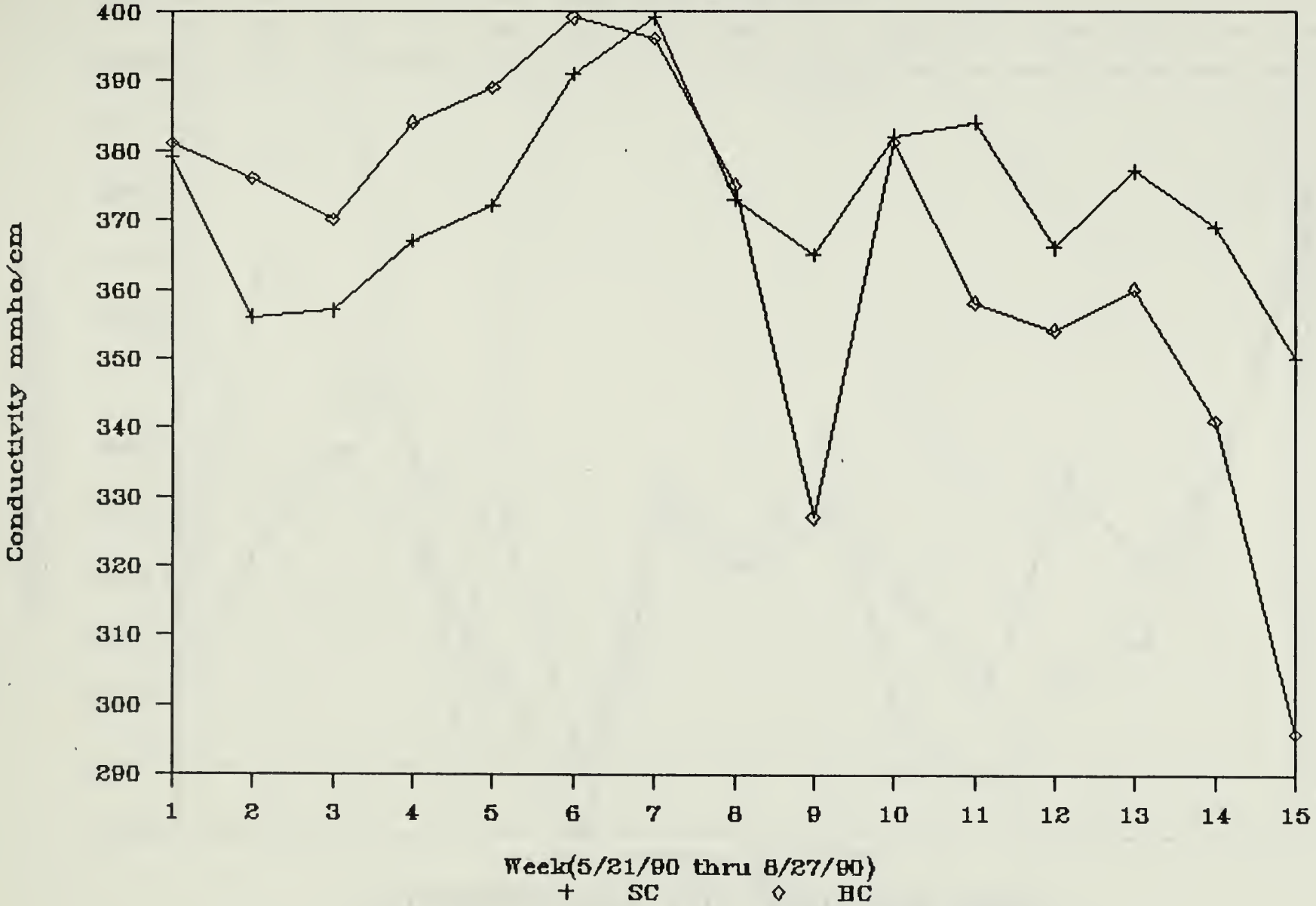
Conductivity for Jamaica Bay

Site JB-11



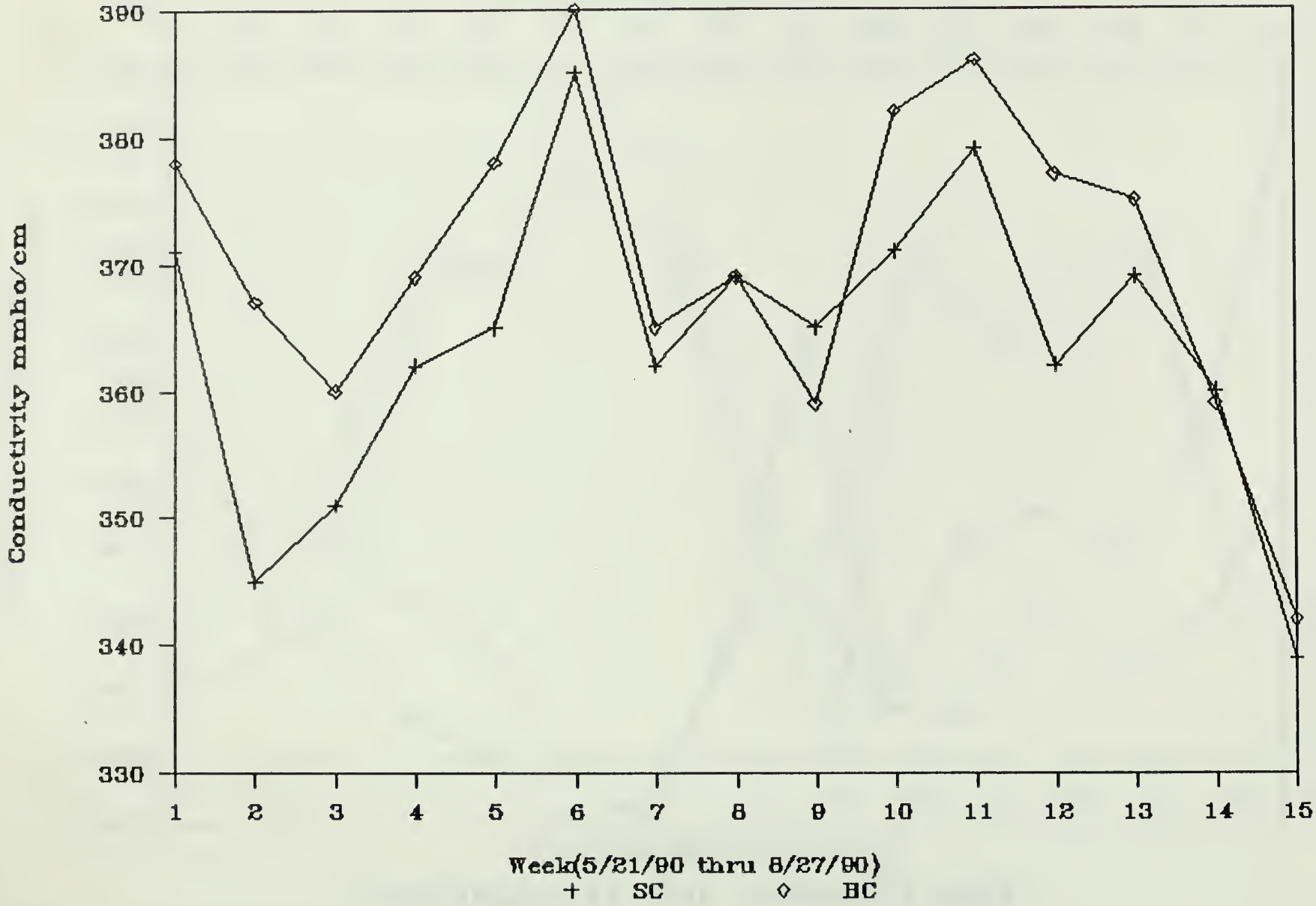
Conductivity for Jamaica Bay

Site JB-12



Conductivity for Jamaica Bay

Site JB-13

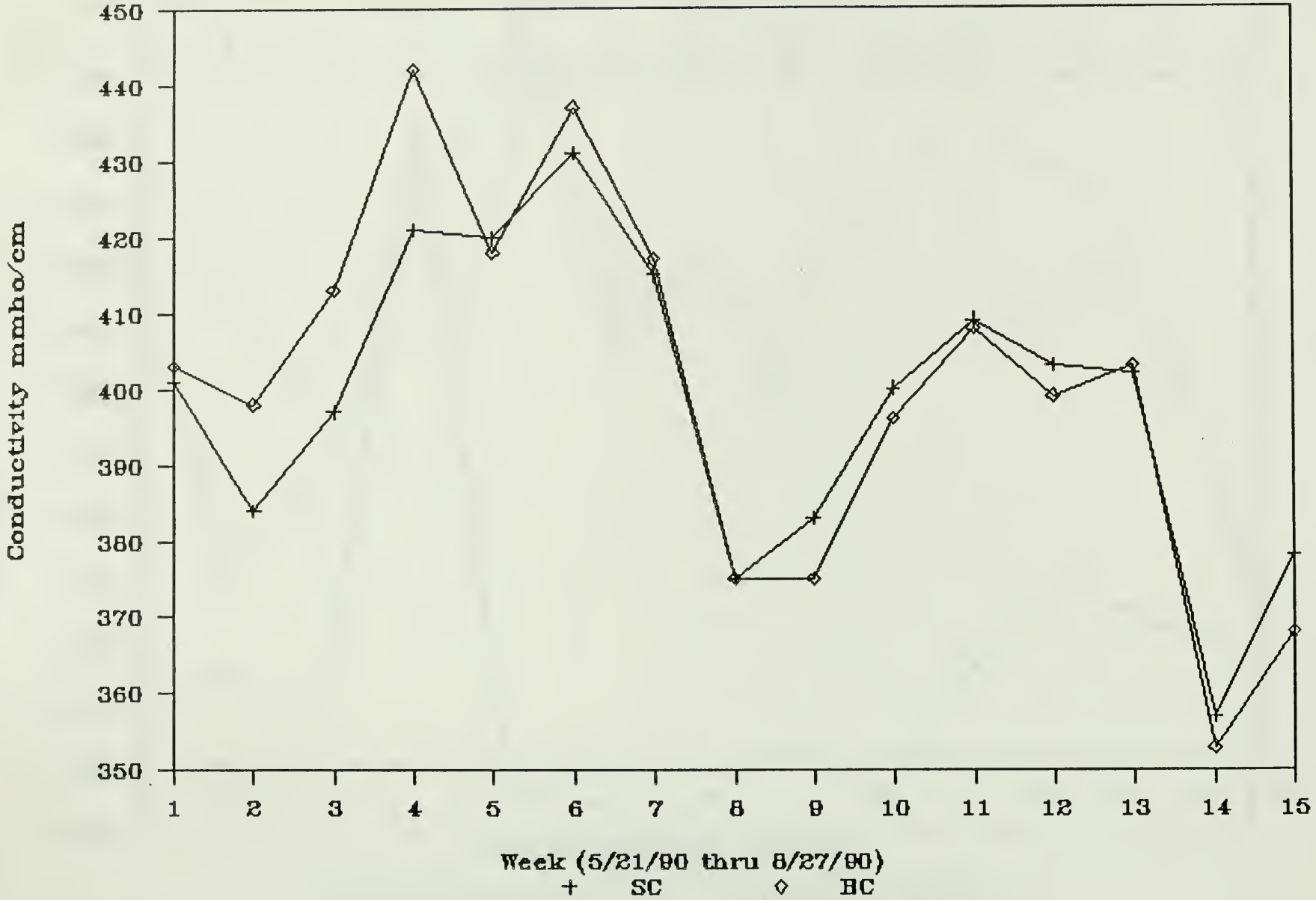


Conductivity for Jamaica Bay

Site JB-14

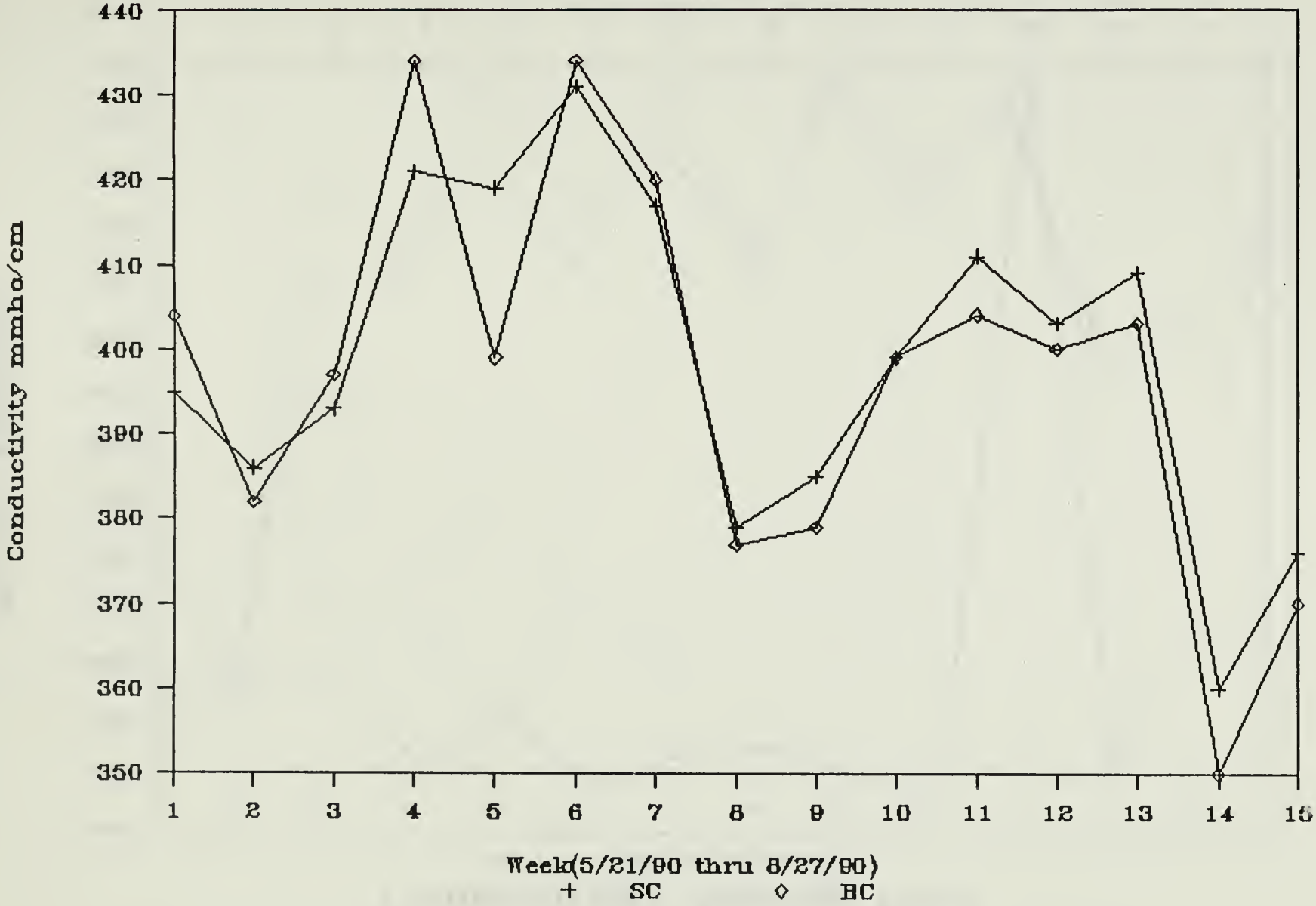
Conductivity for Marine Park

Site MP-1



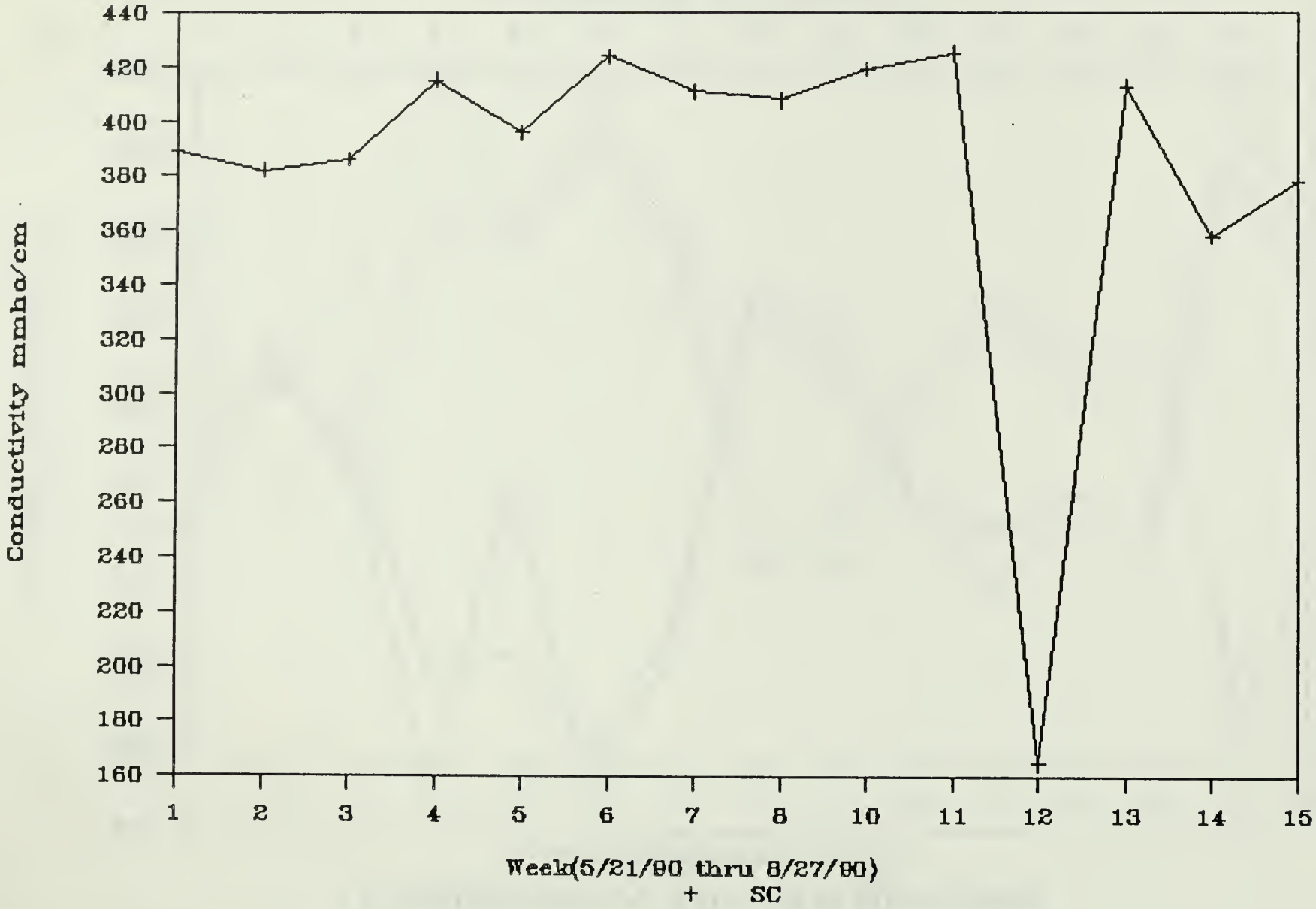
Conductivity for Marine Park

Site MP-2



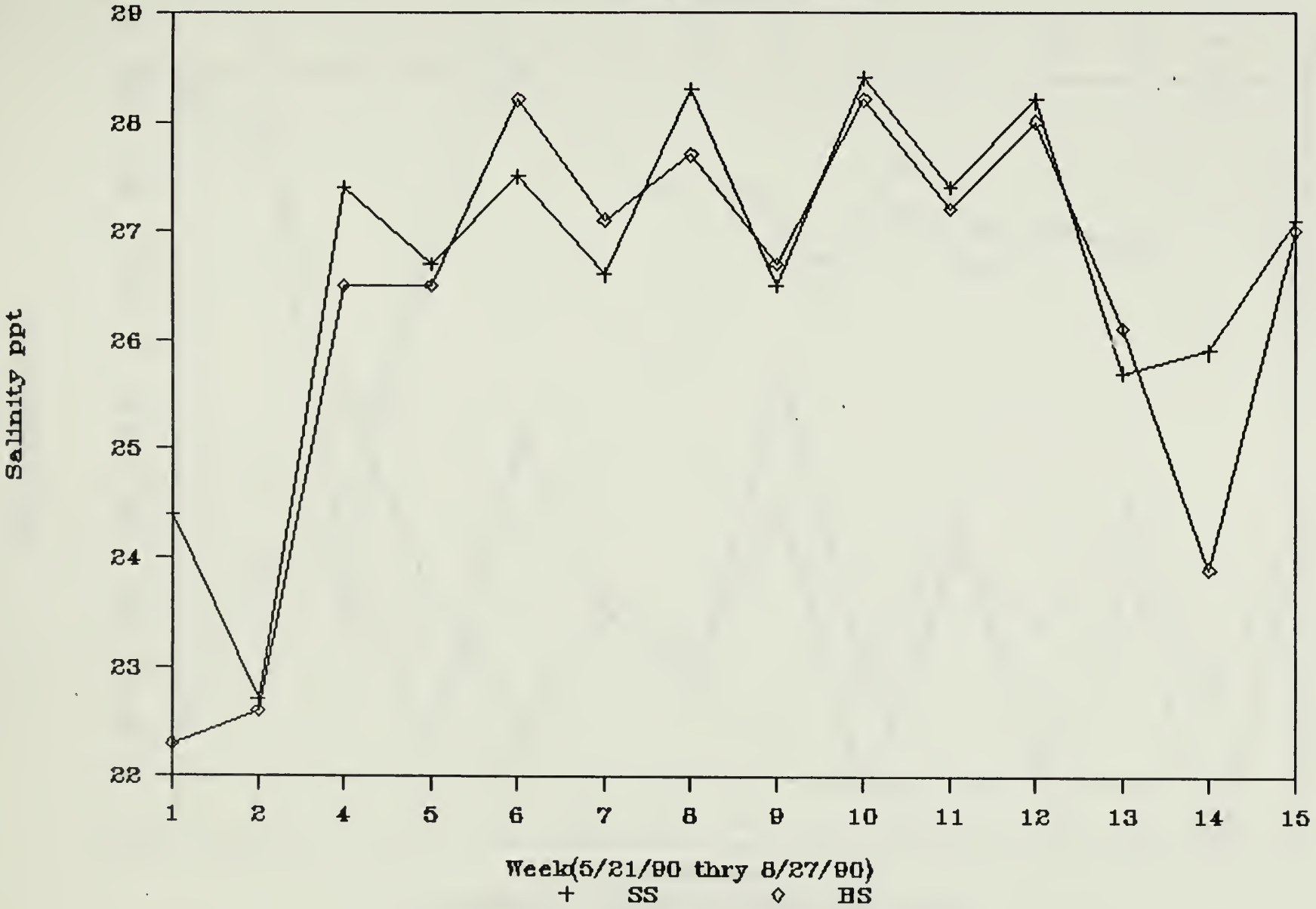
Conductivity Marine Park

Site MP-3



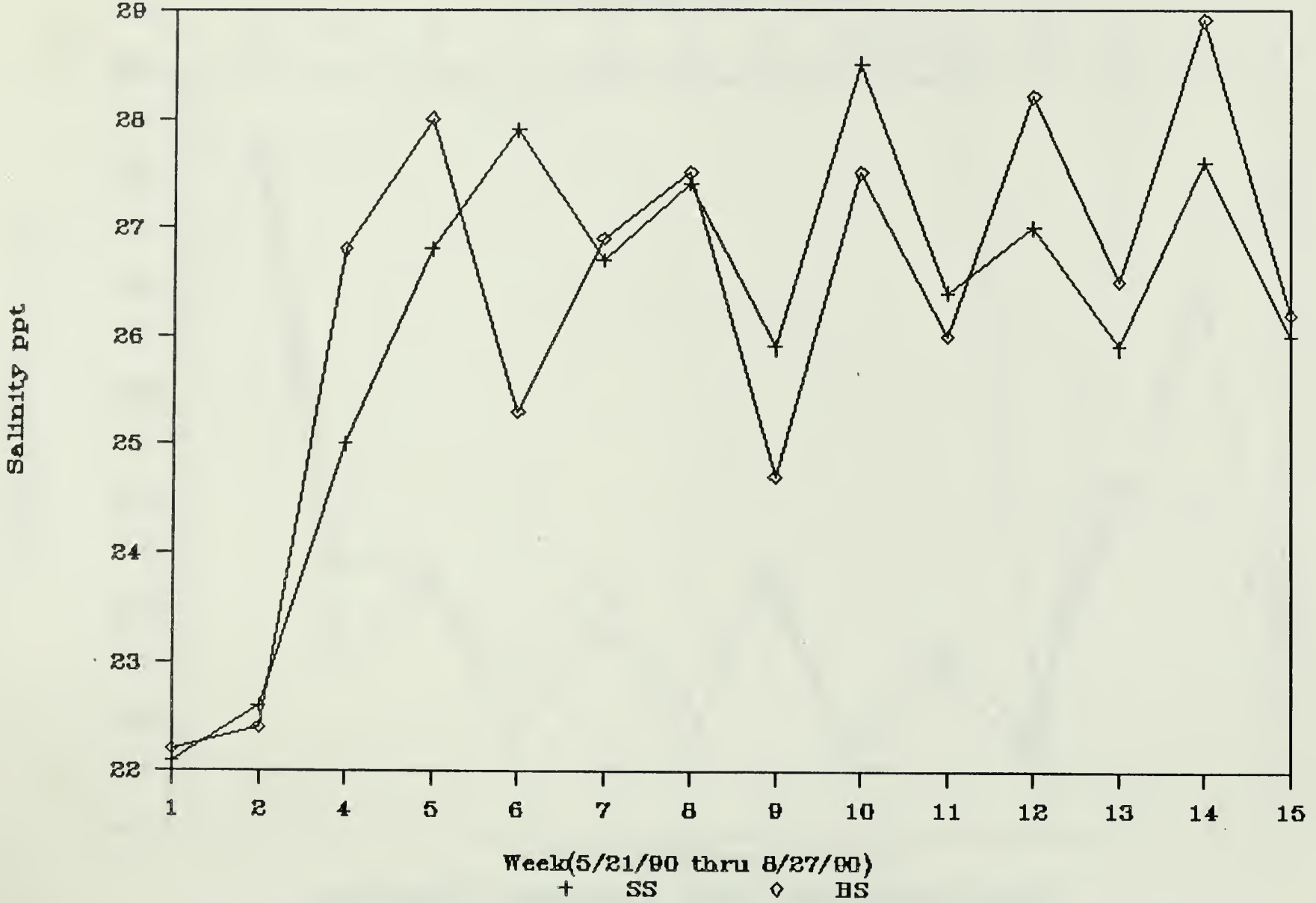
Weekly Salinity for Jamaica Bay

Site RI-3



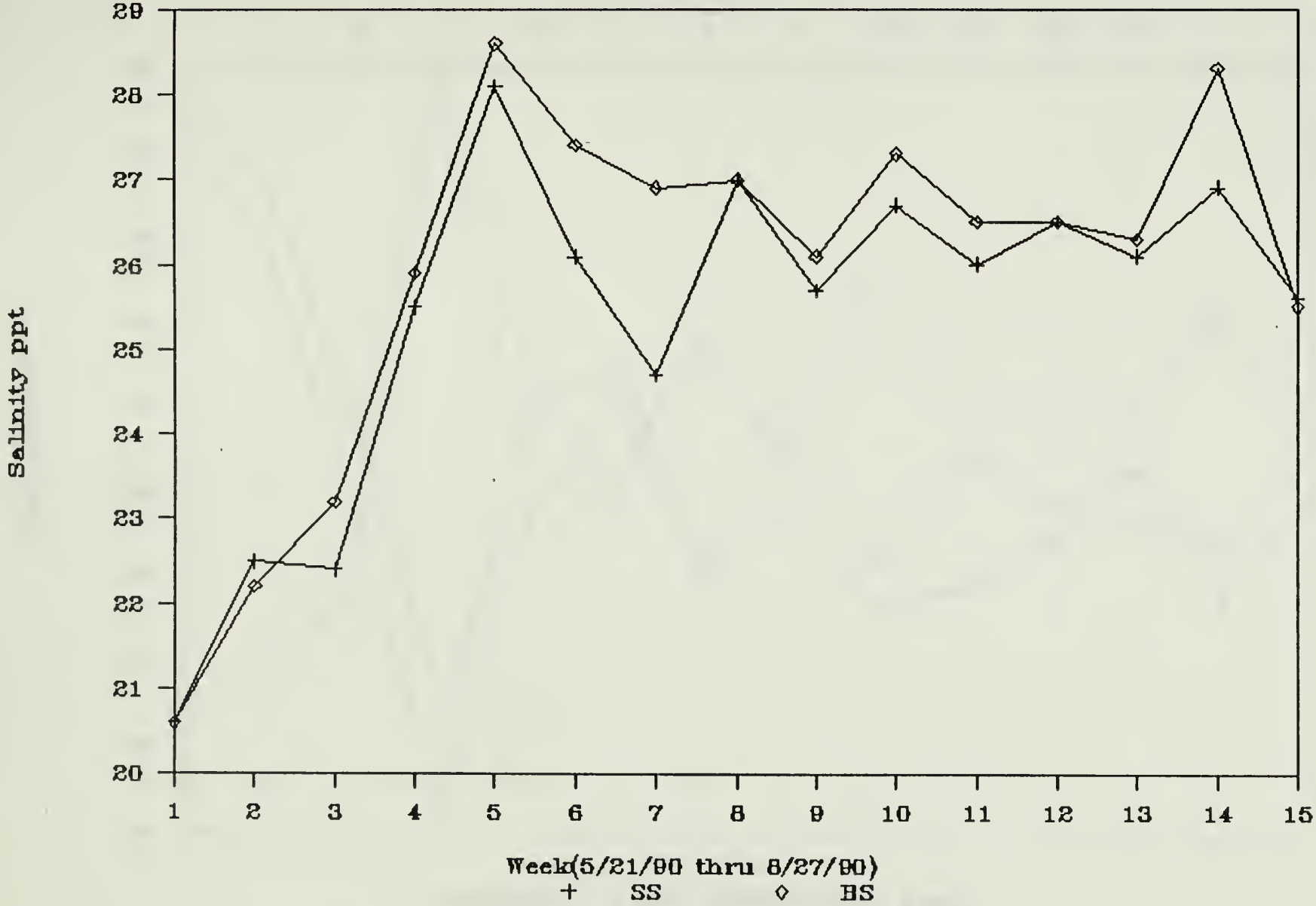
Salinity for Jamaica Bay

Site MPB-4



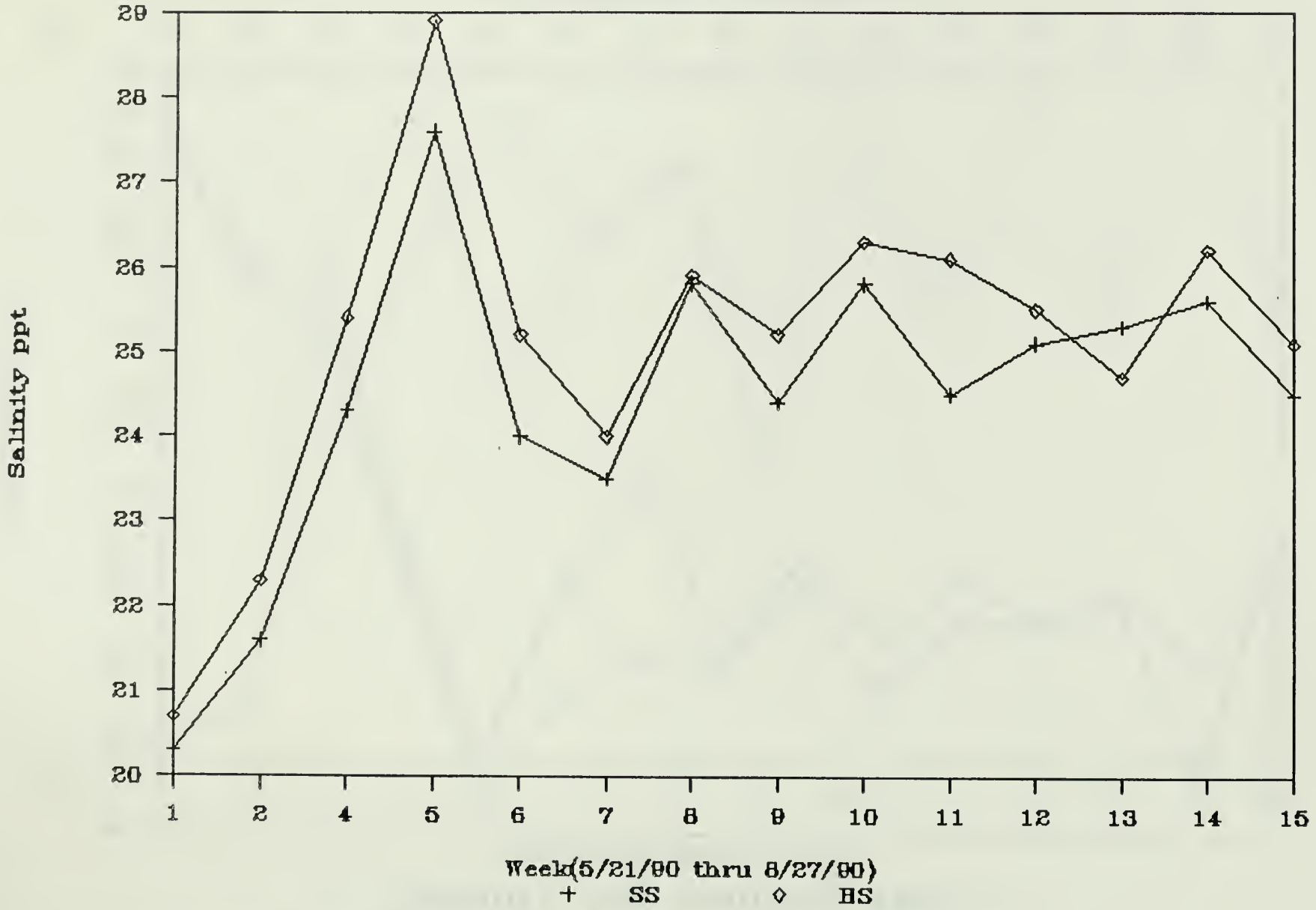
Salinity for Jamaica Bay

Site JB-5



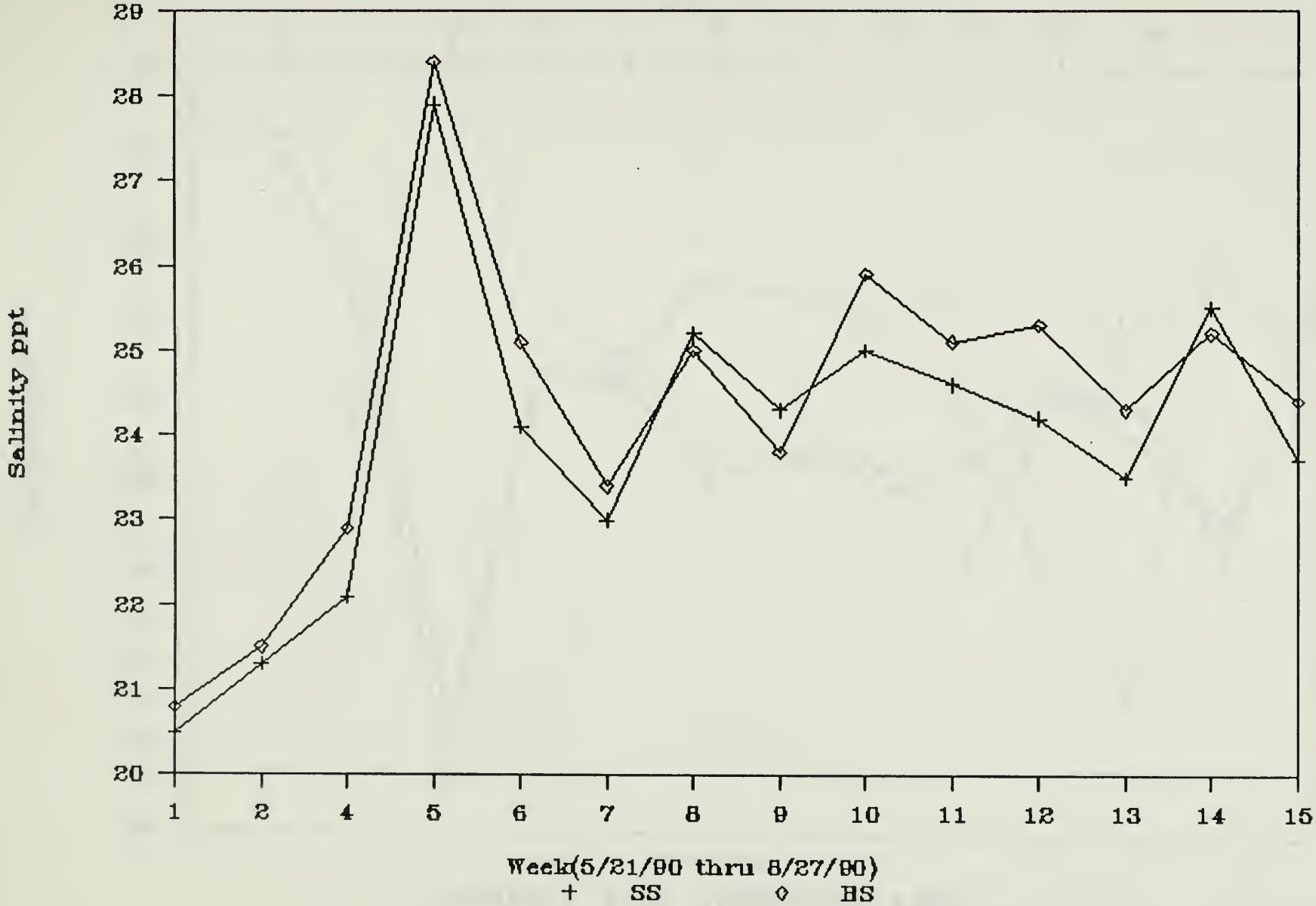
Salinity for Jamaica Bay

Site JB-6



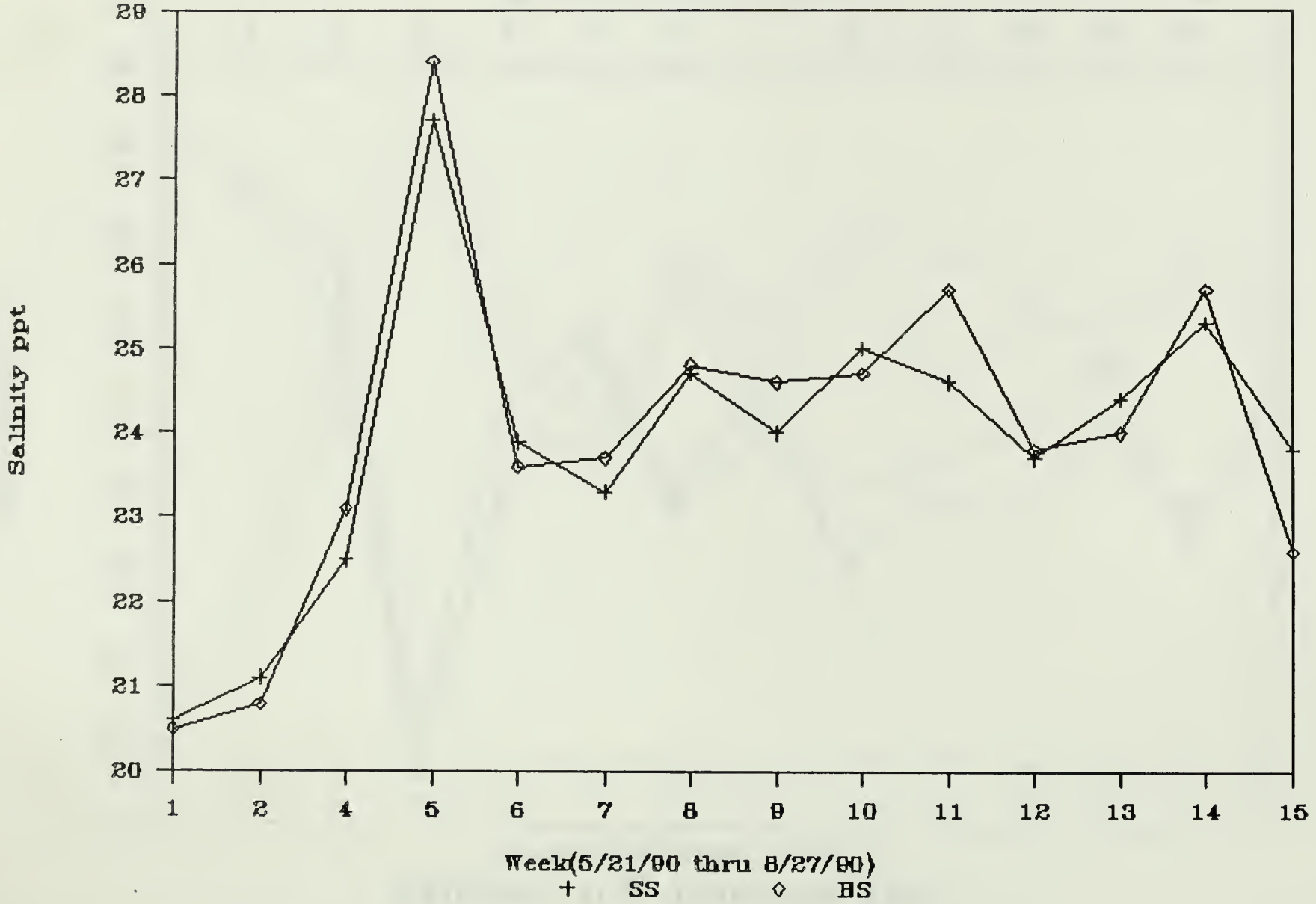
Salinity for Jamaica Bay

Site JB-6A

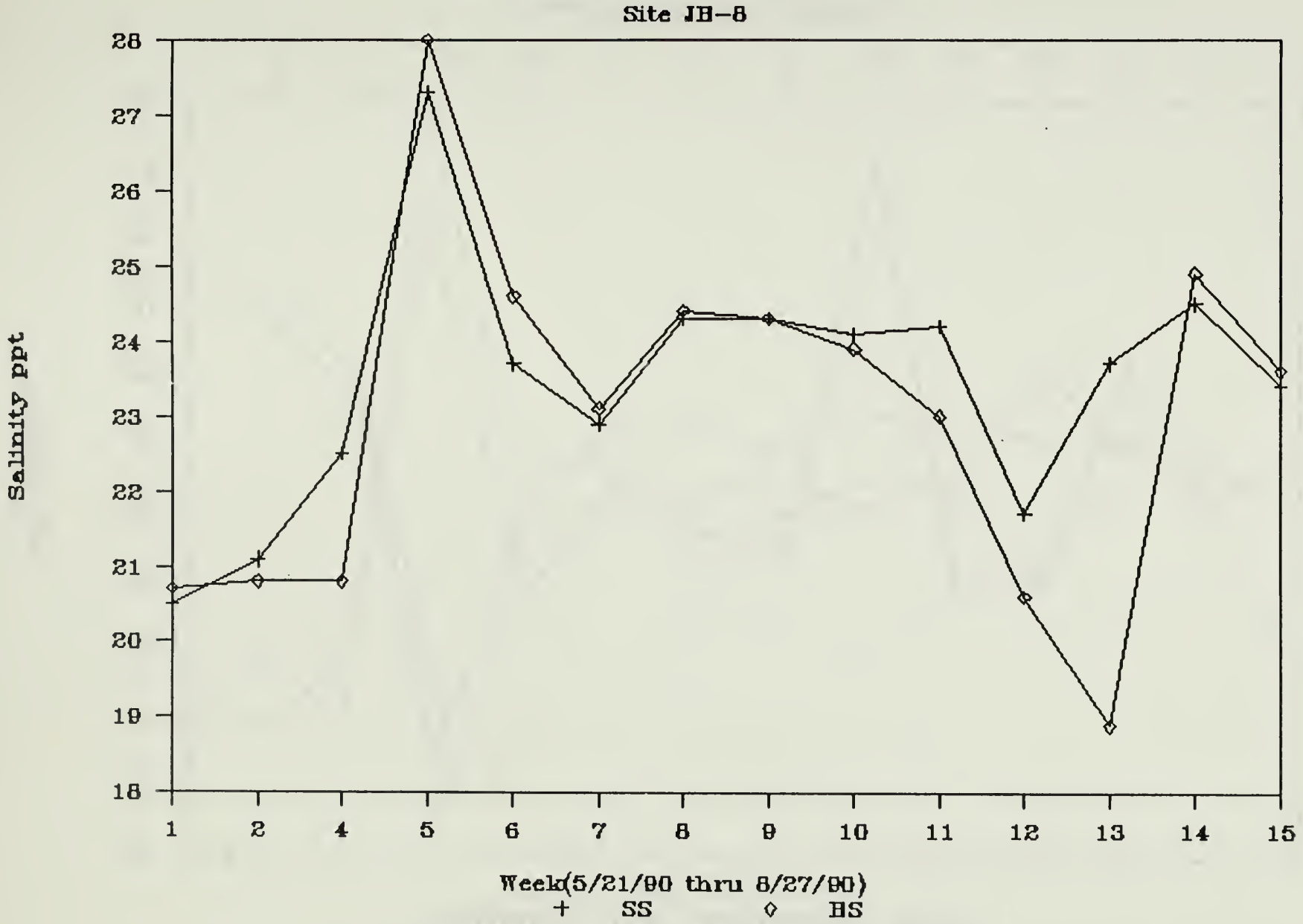


Salinity for Jamaica Bay

Site JB-7

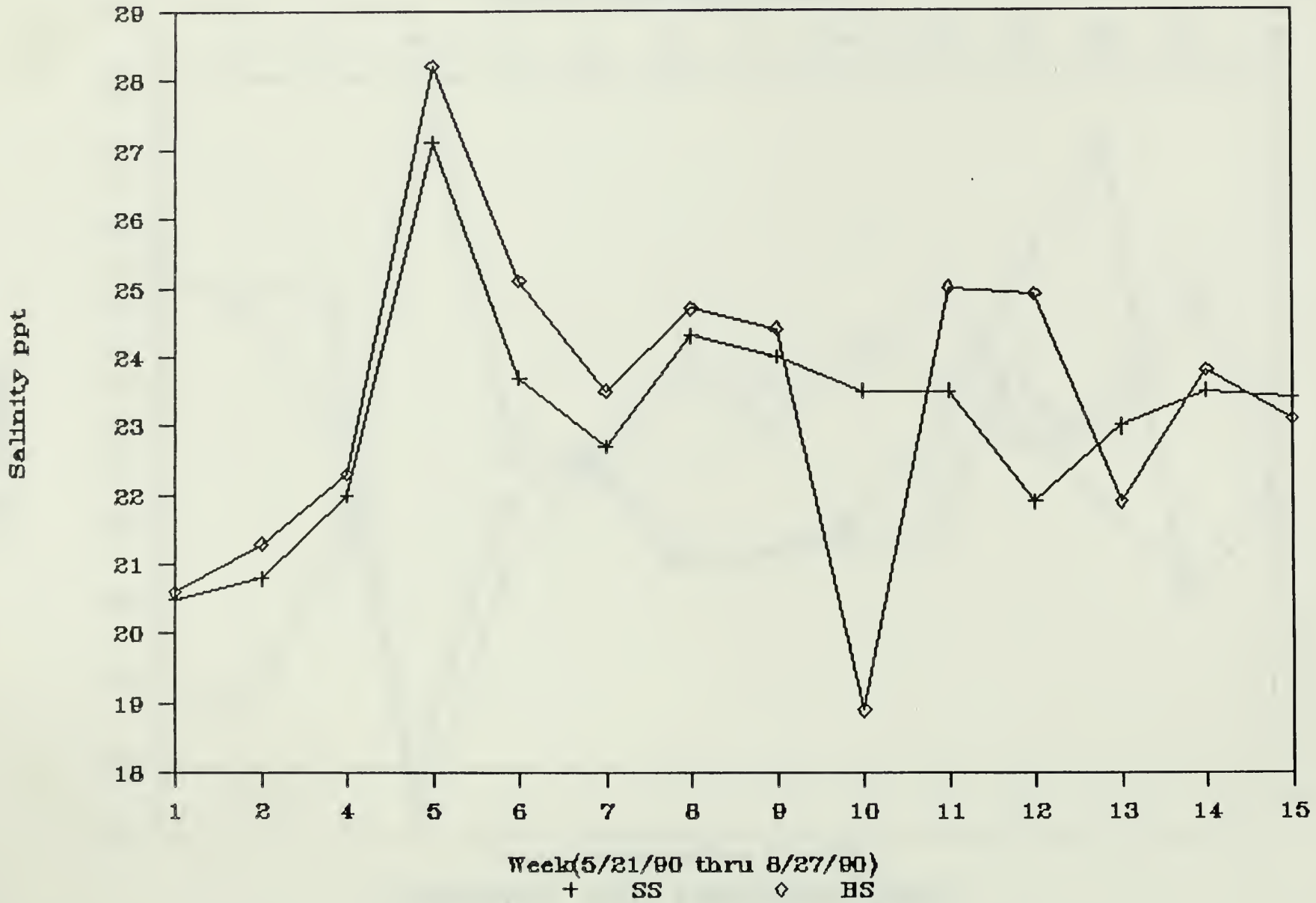


Salinity for Jamaica Bay



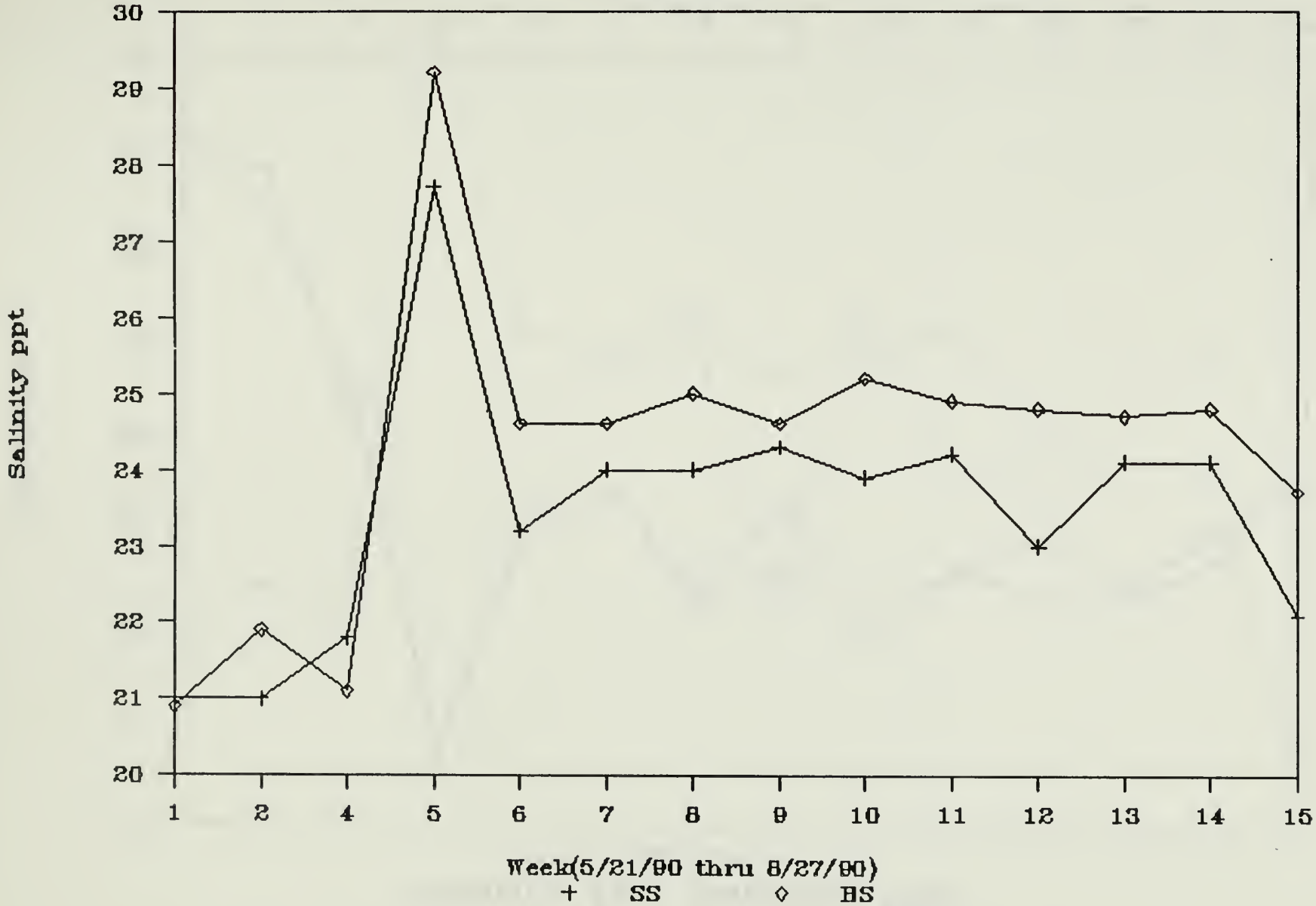
Salinity for Jamaica Bay

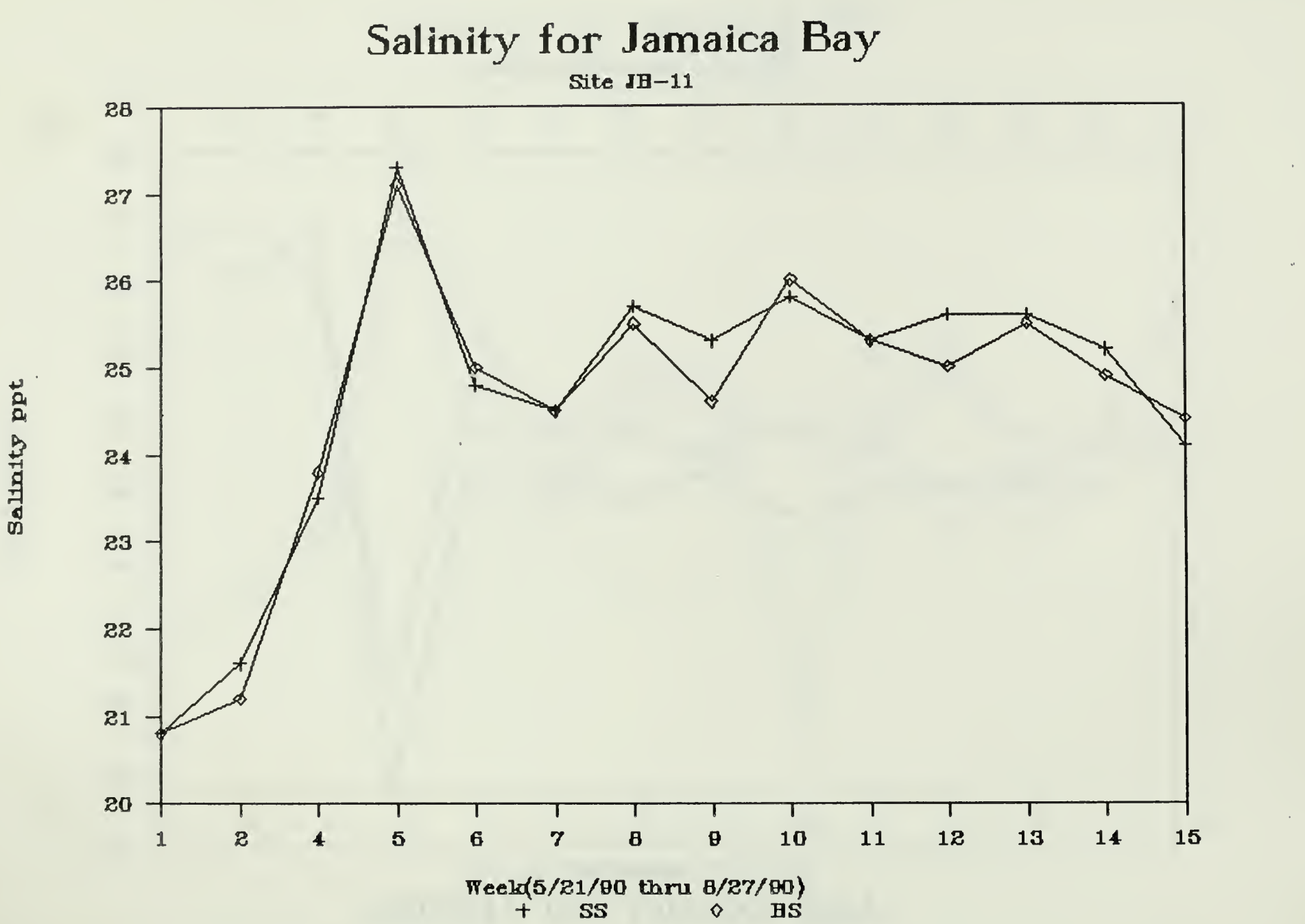
Site JB-9



Salinity for Jamaica Bay

Site JB-10




Salinity for Jamaica Bay
Site JB-11
Salinity ppt
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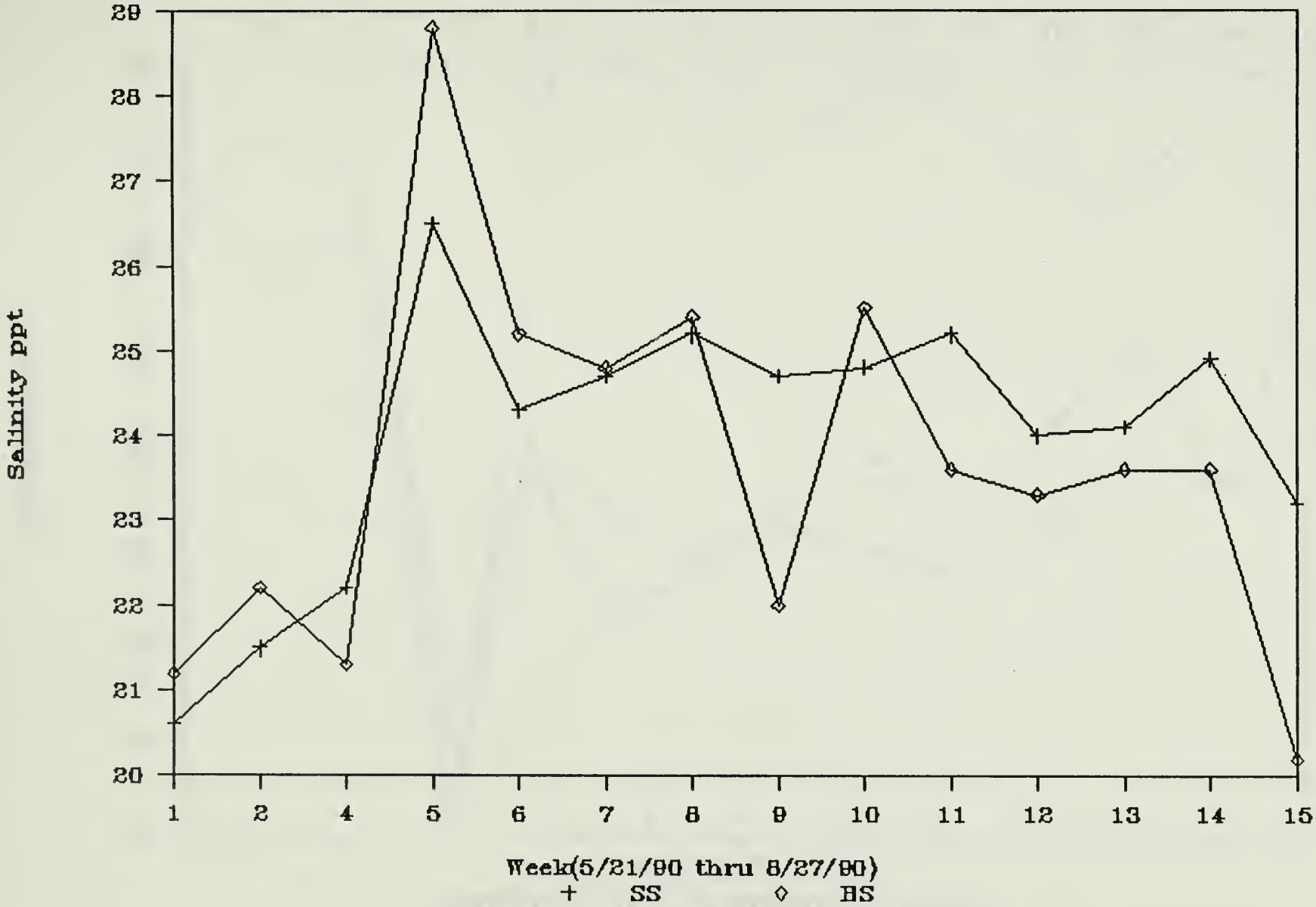
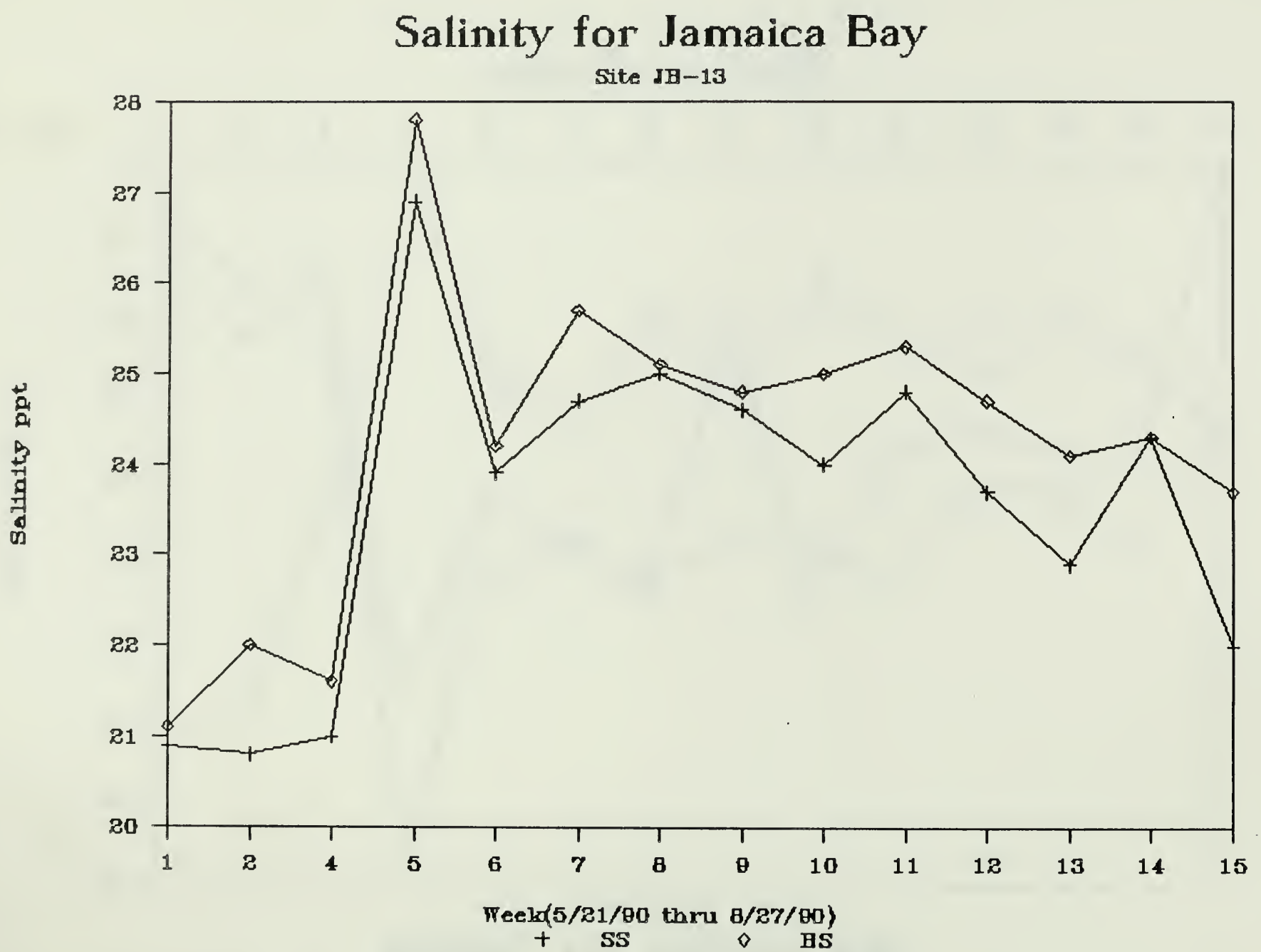
Week(5/21/90 thru 8/27/90)
+ SS
◊ BS

Salinity for Jamaica Bay

Site JB-12




Salinity for Jamaica Bay
Site JB-13
Salinity ppt
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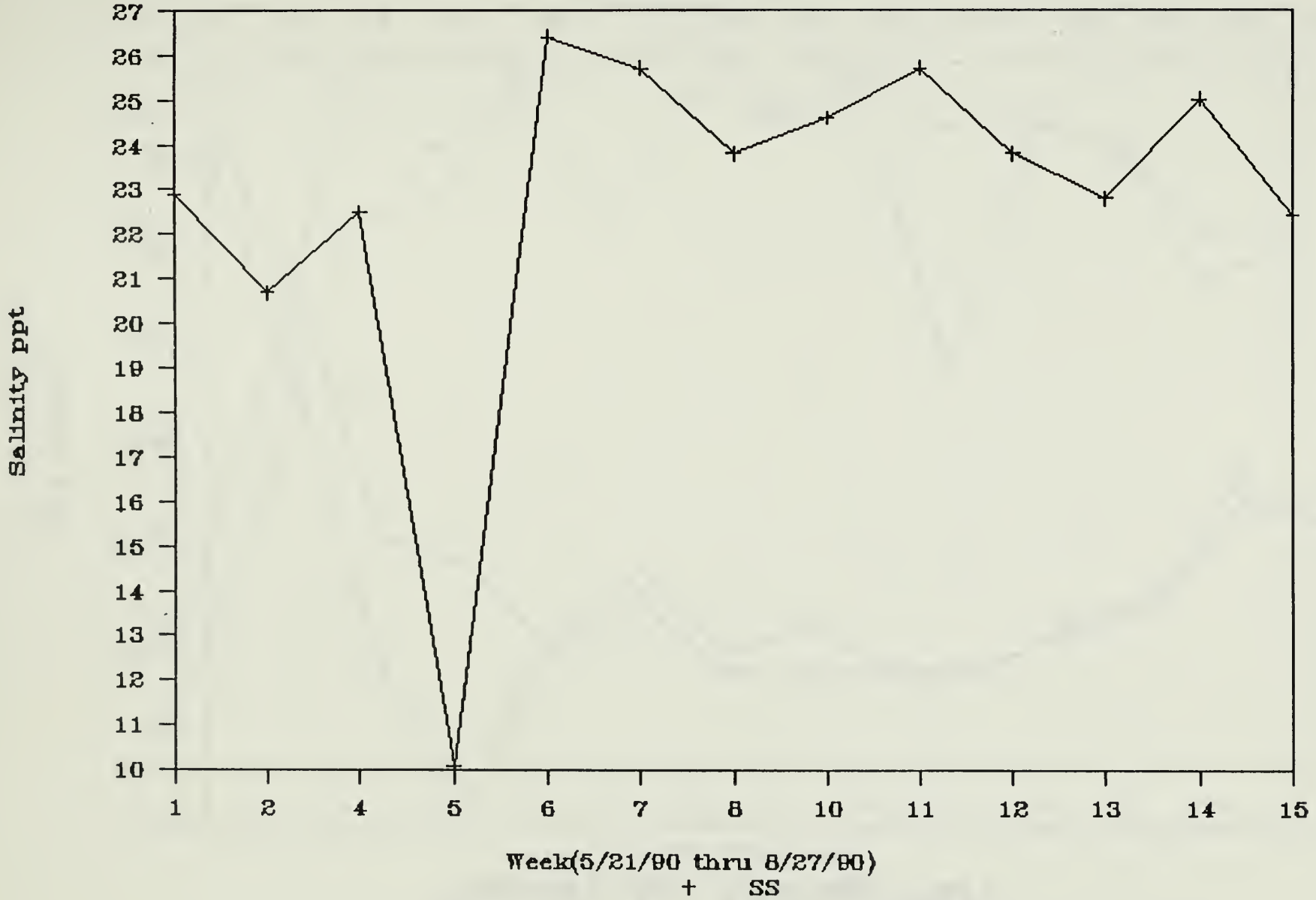
Week(5/21/90 thru 8/27/90)
+ SS
◊ BS

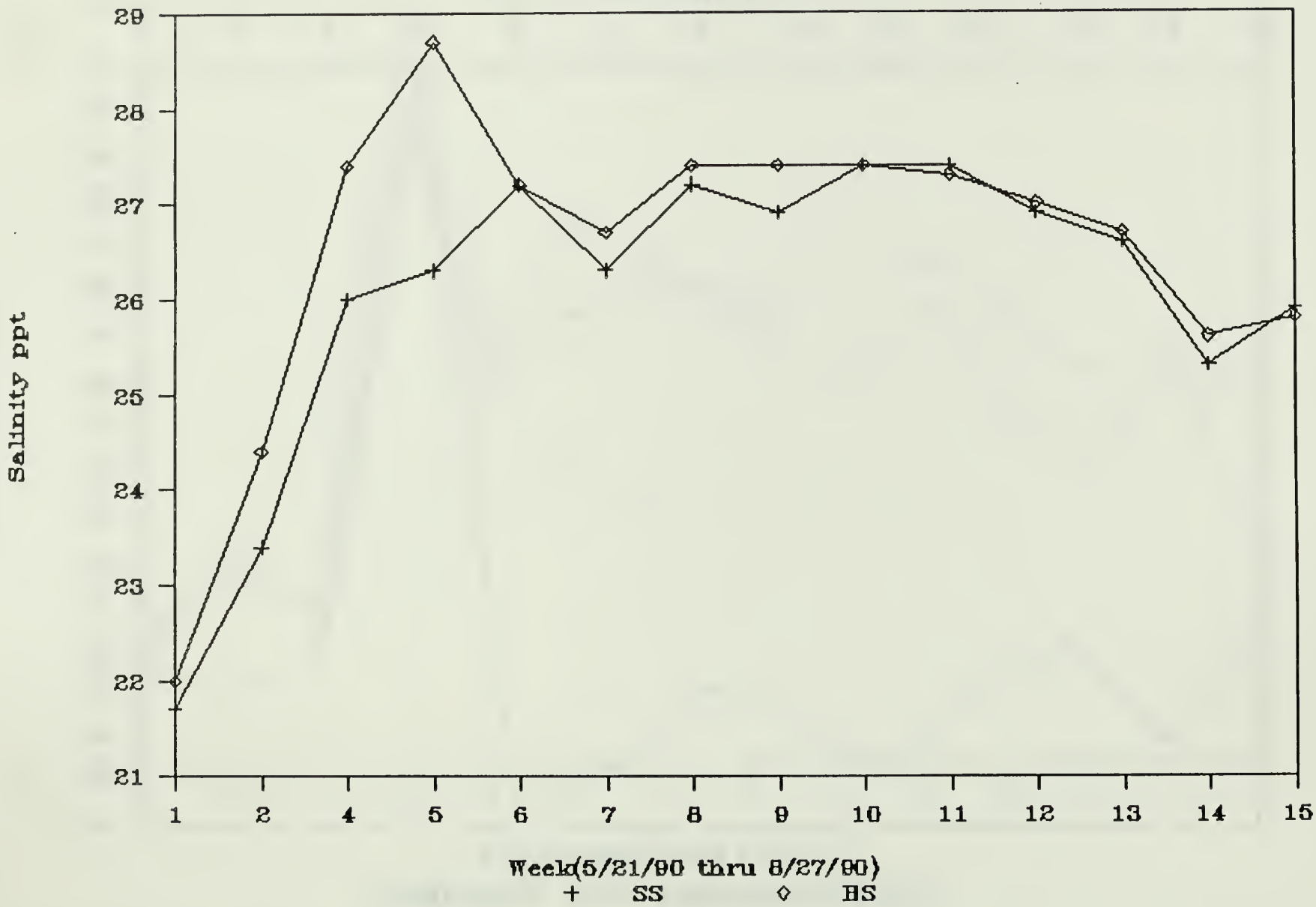
Salinity for Jamaica Bay

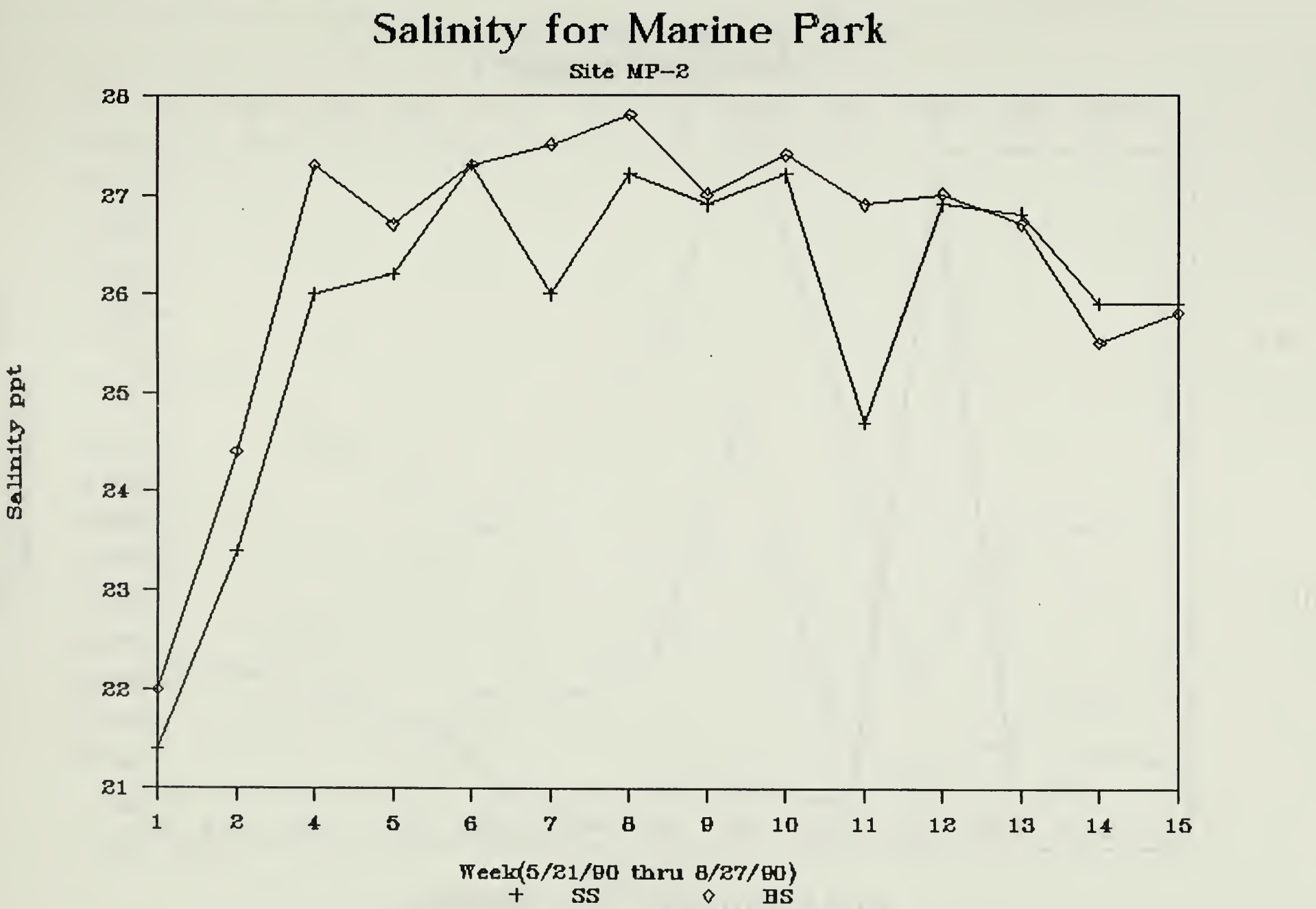
Site JB-14



Salinity for Marine Park

Site MP-1




Salinity for Marine Park
Site MP-2
Salinity ppt
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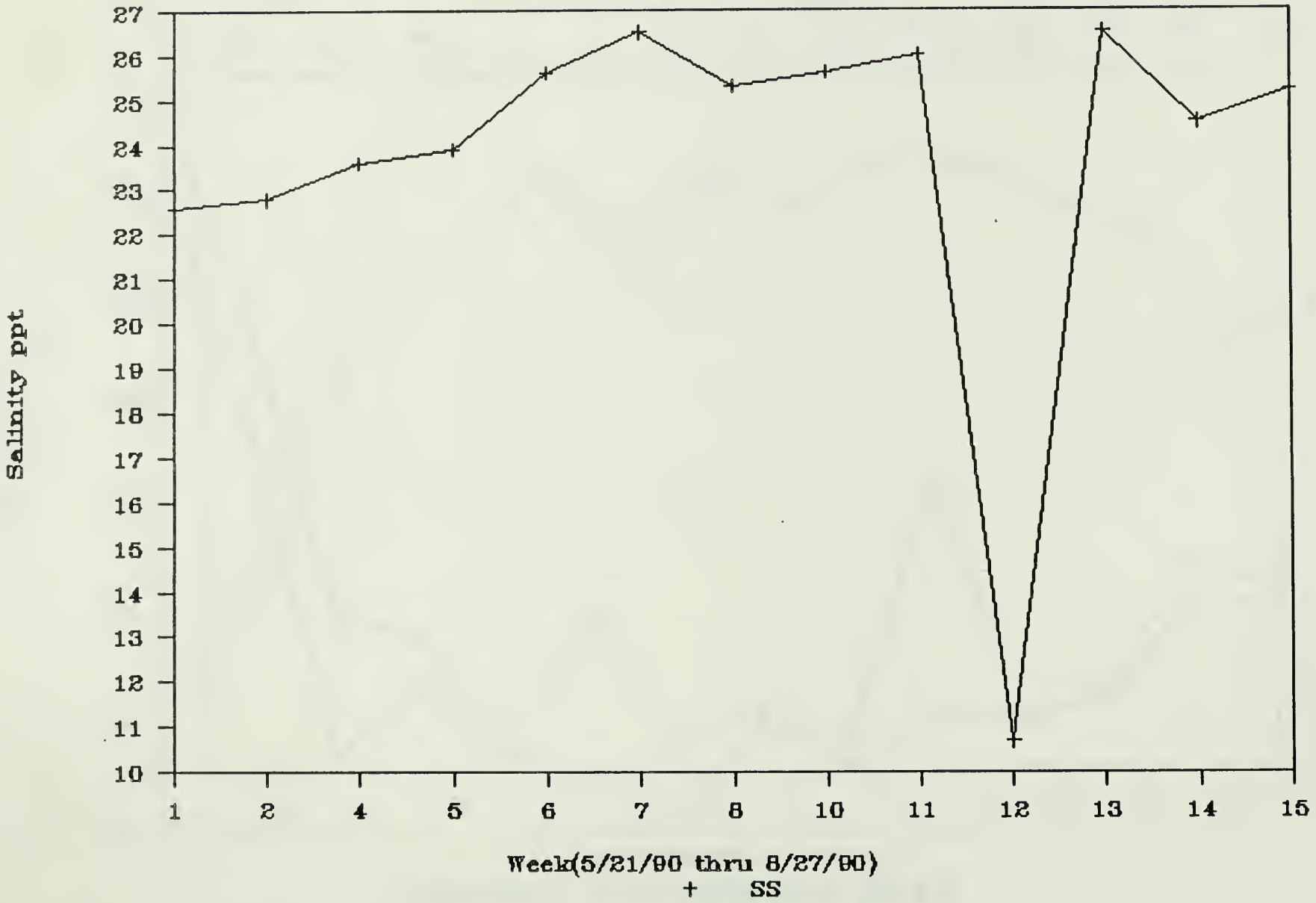
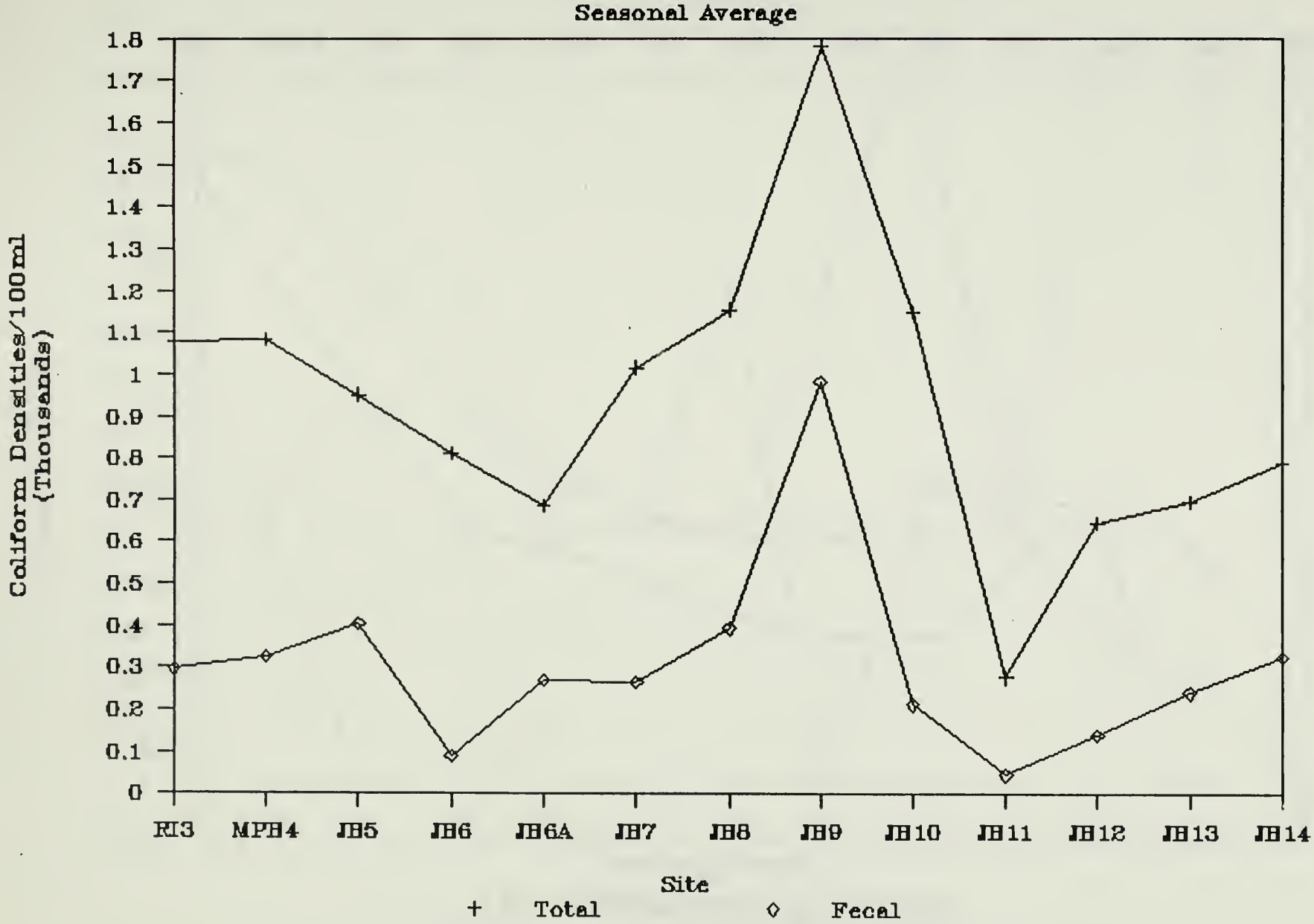
Week(5/21/90 thru 8/27/90)
+ SS
◇ BS

Salinity for Marine Park

Site MP-3

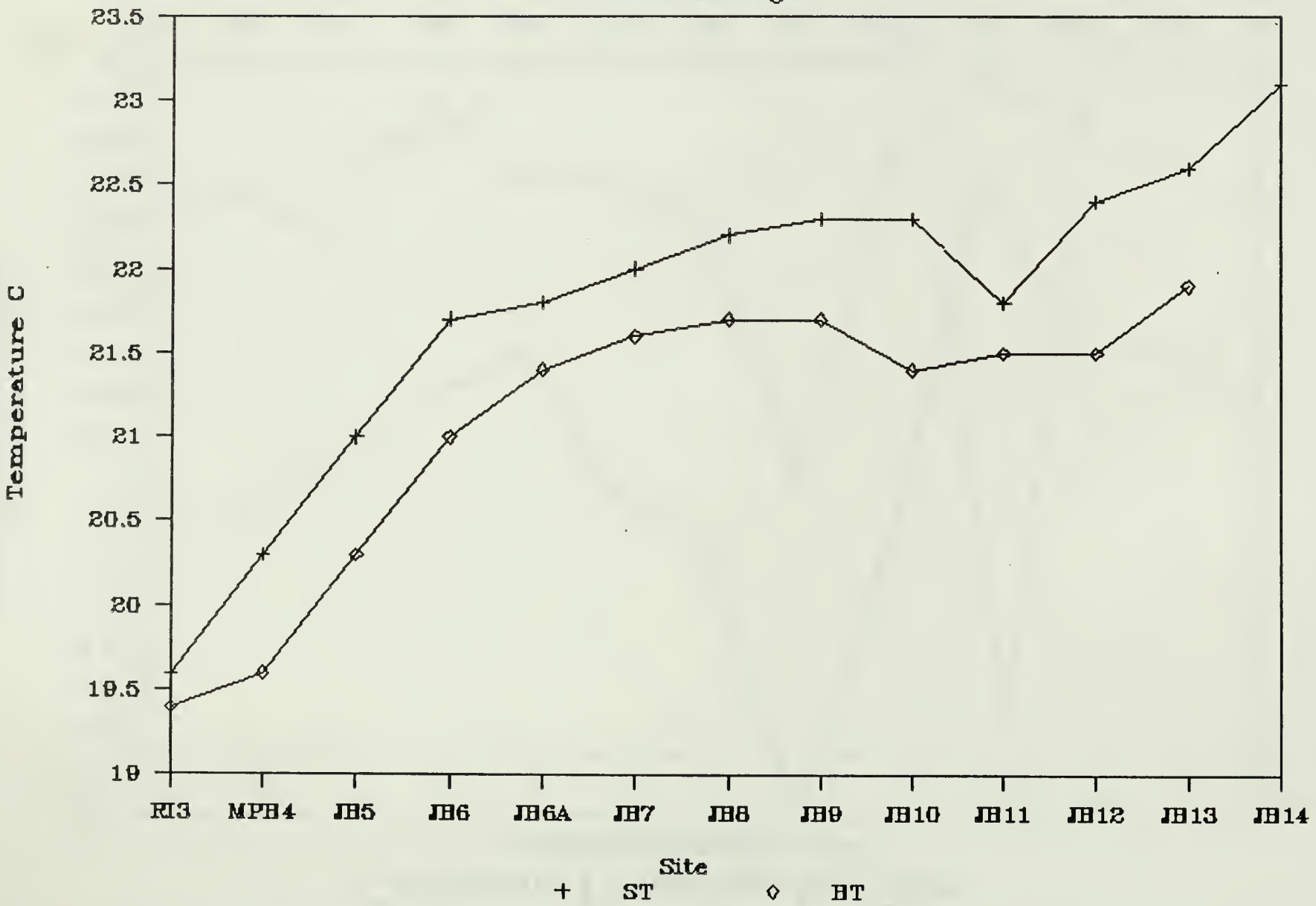


Coliform Densites by Site



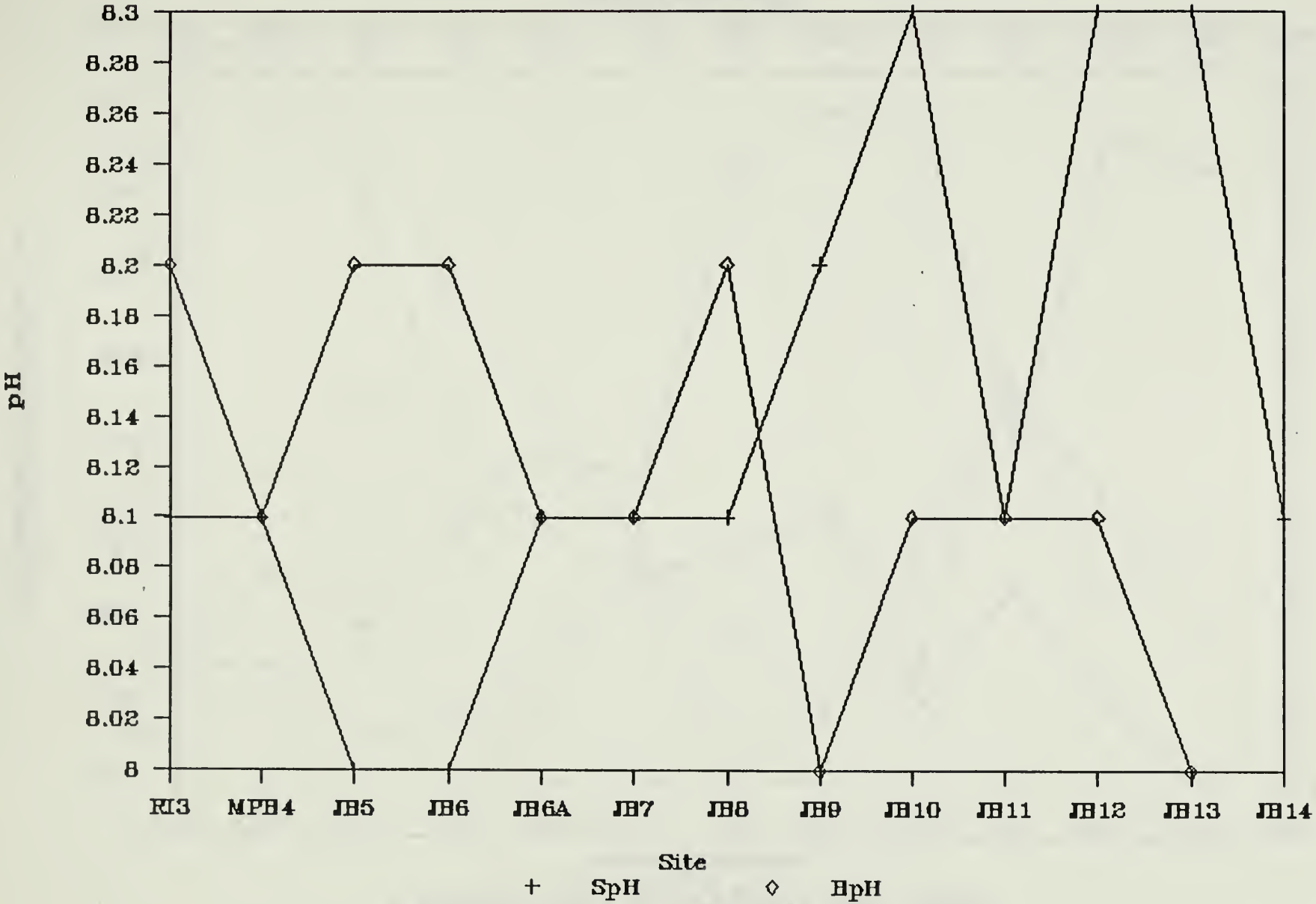
Temperature by Site

Seasonal Average



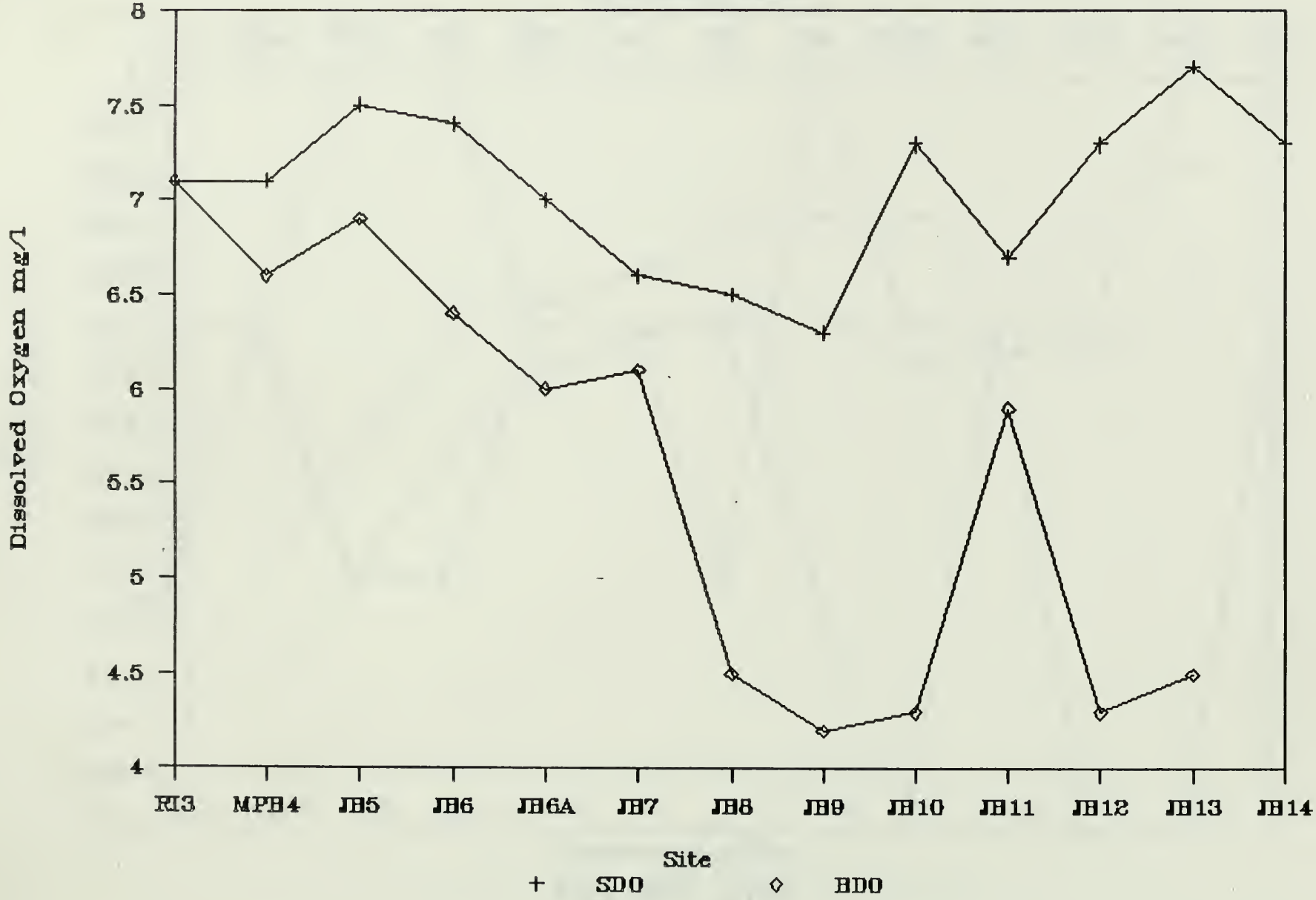
pH by Site

Seasonal Average



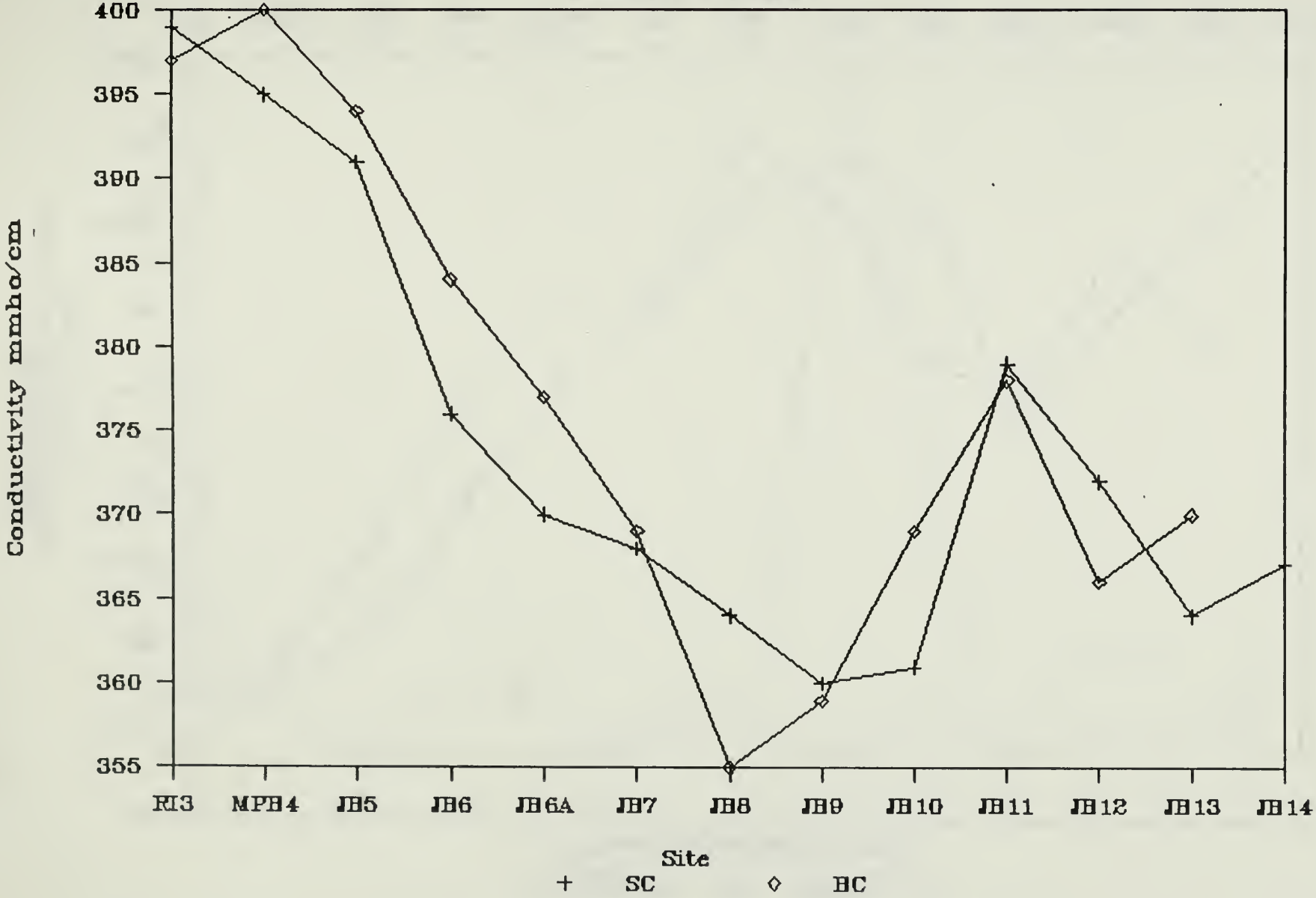
Dissolved Oxygen by Site

Seasonal Average



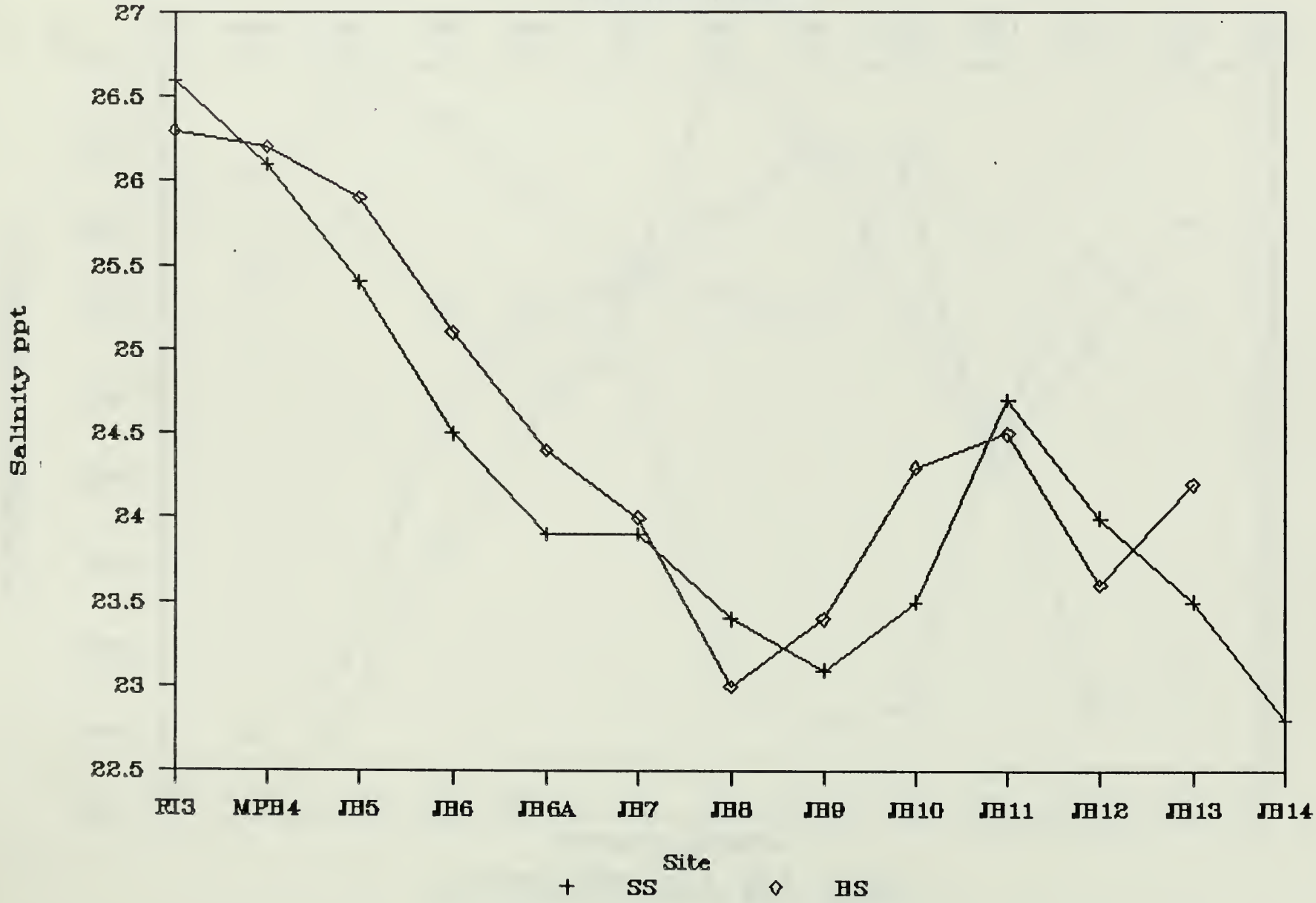
Conductivity by Site

Seasonal Average



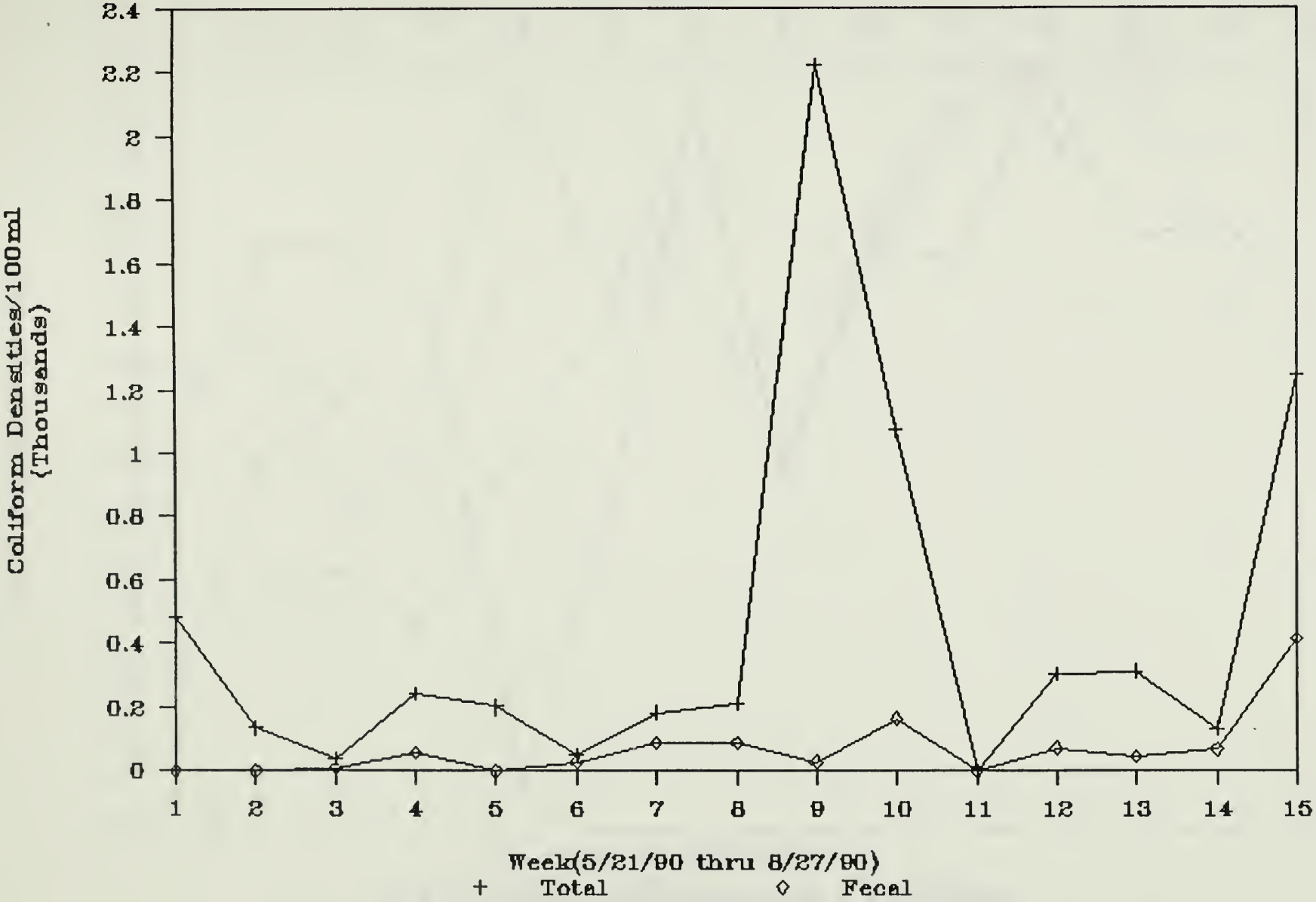
Salinity by Site

Seasonal Average



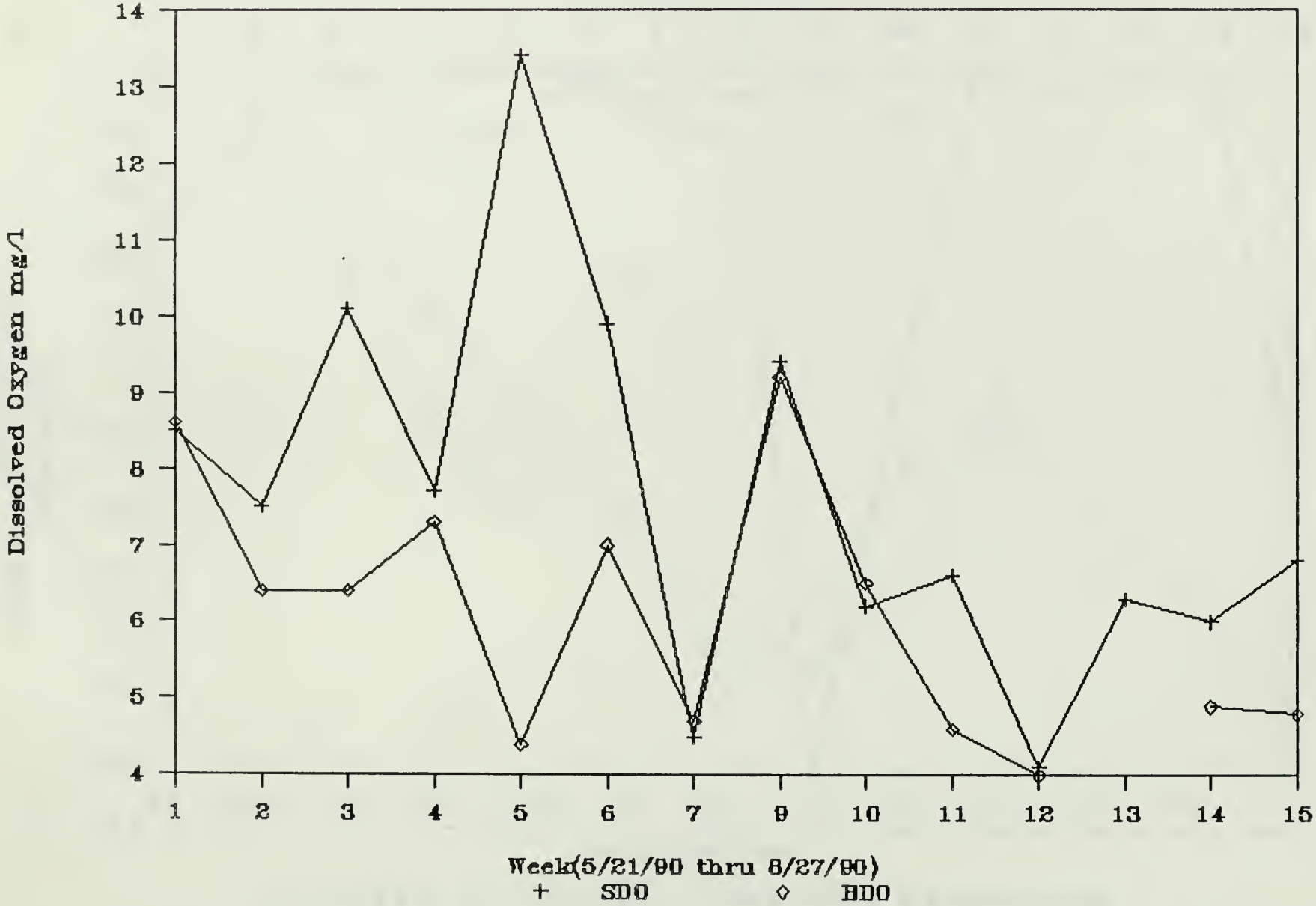
Weekly Average Coliform Densities

for Marine Park



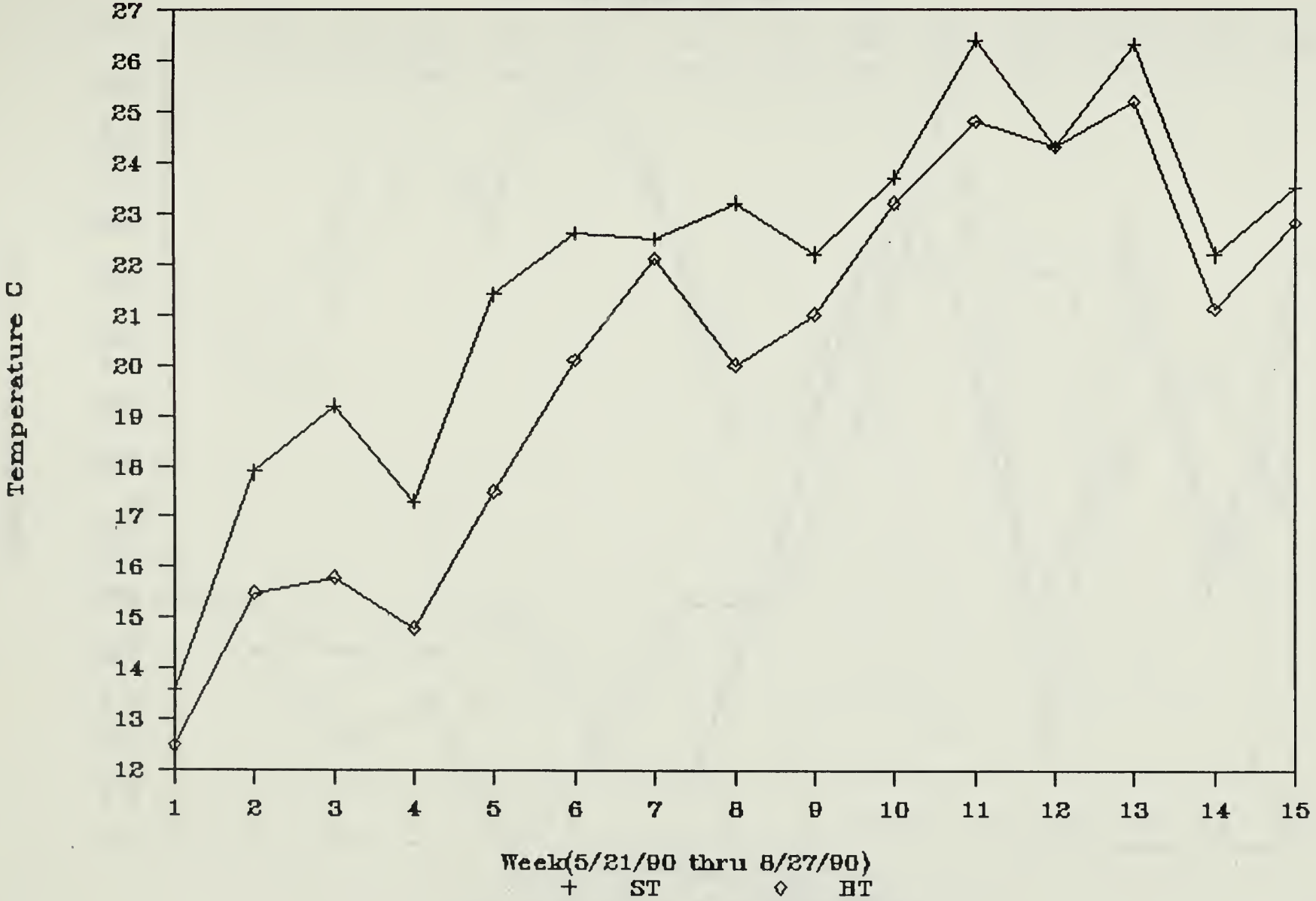
Average Dissolved Oxygen

For Marine Park



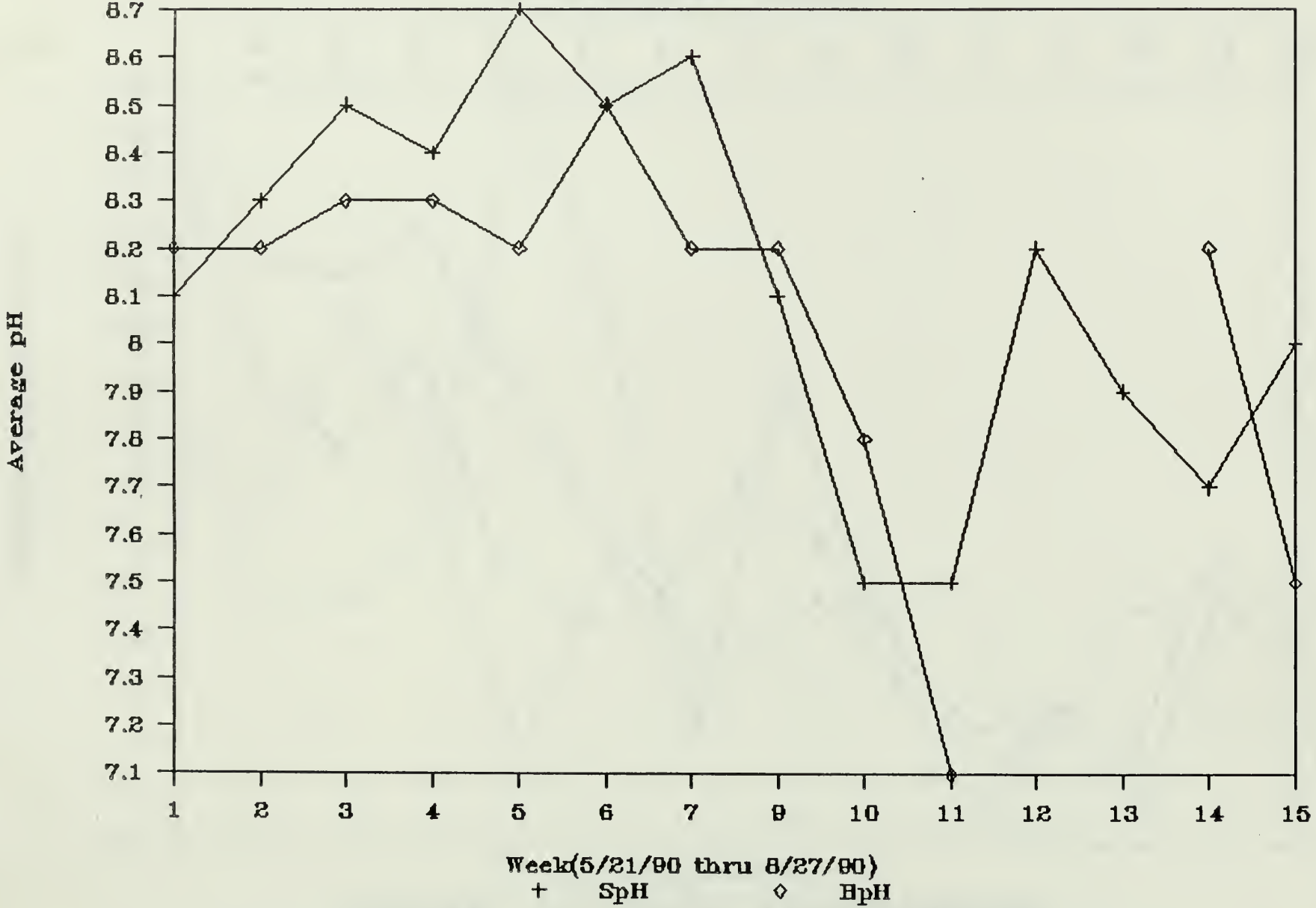
Weekly Average Temperature

for Marine Park



Weekly Average pH

for Marine Park

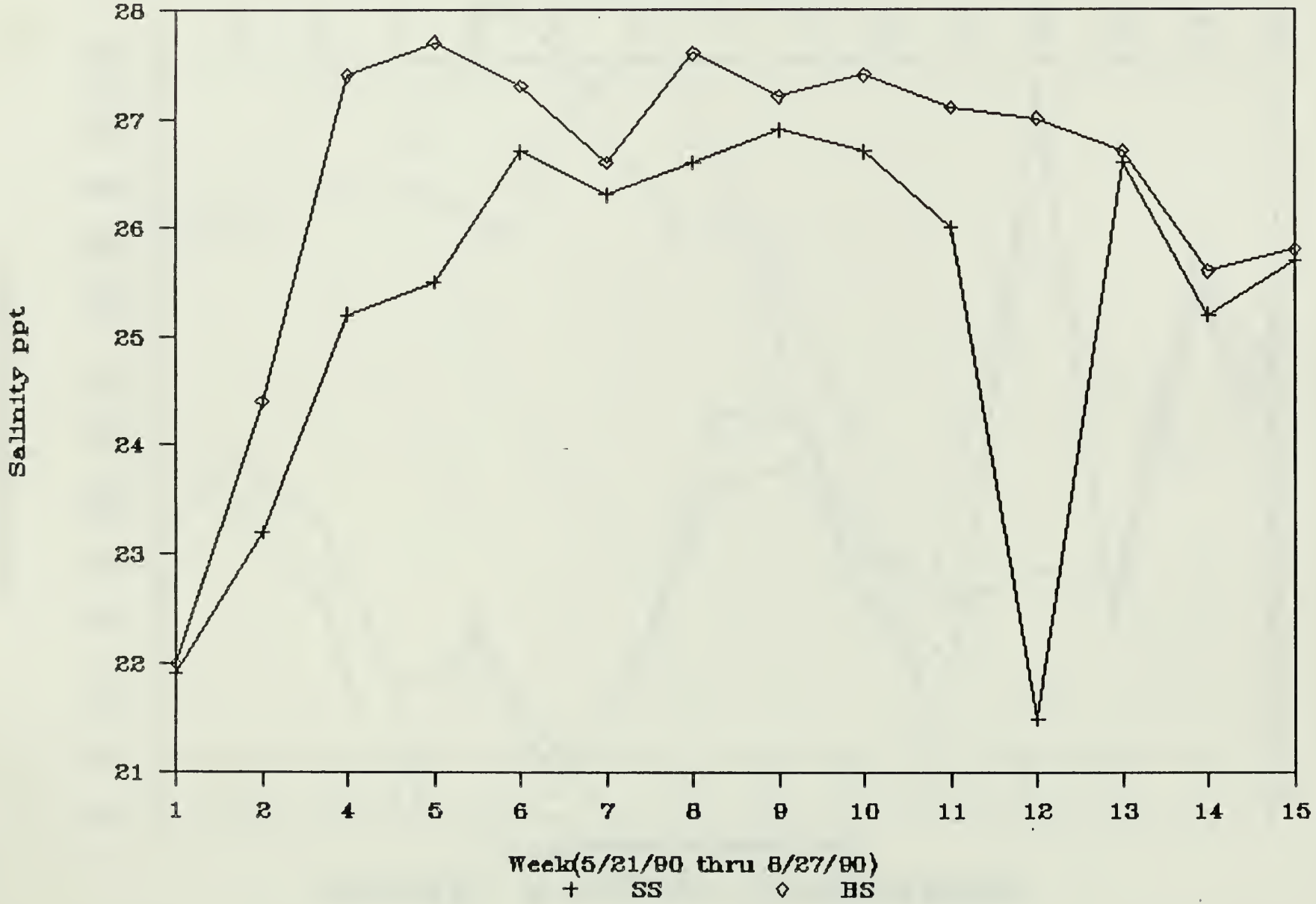


Weekly Average Conductivity

for Marine Park

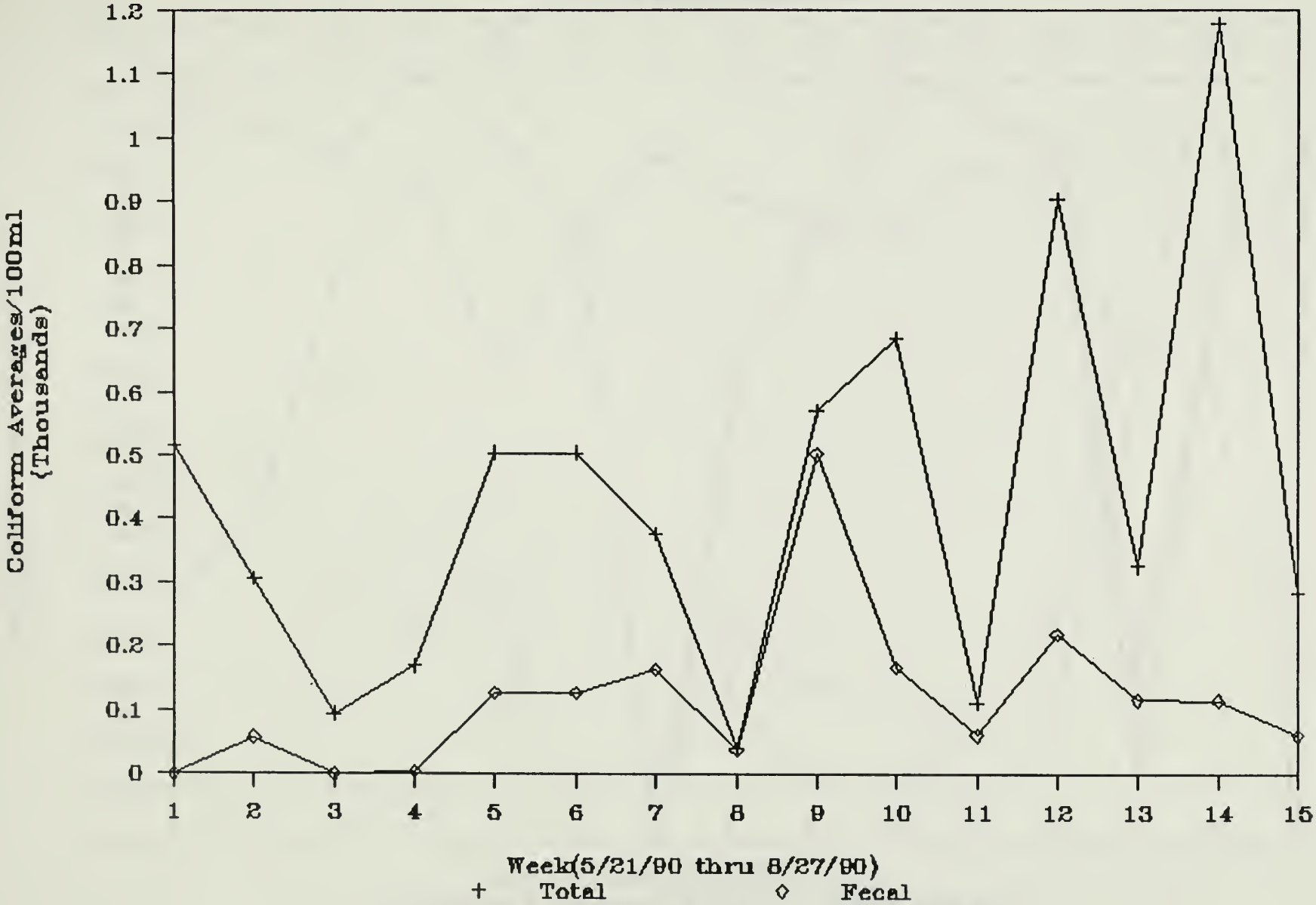
Weekly Average Salinity

for Marine Park



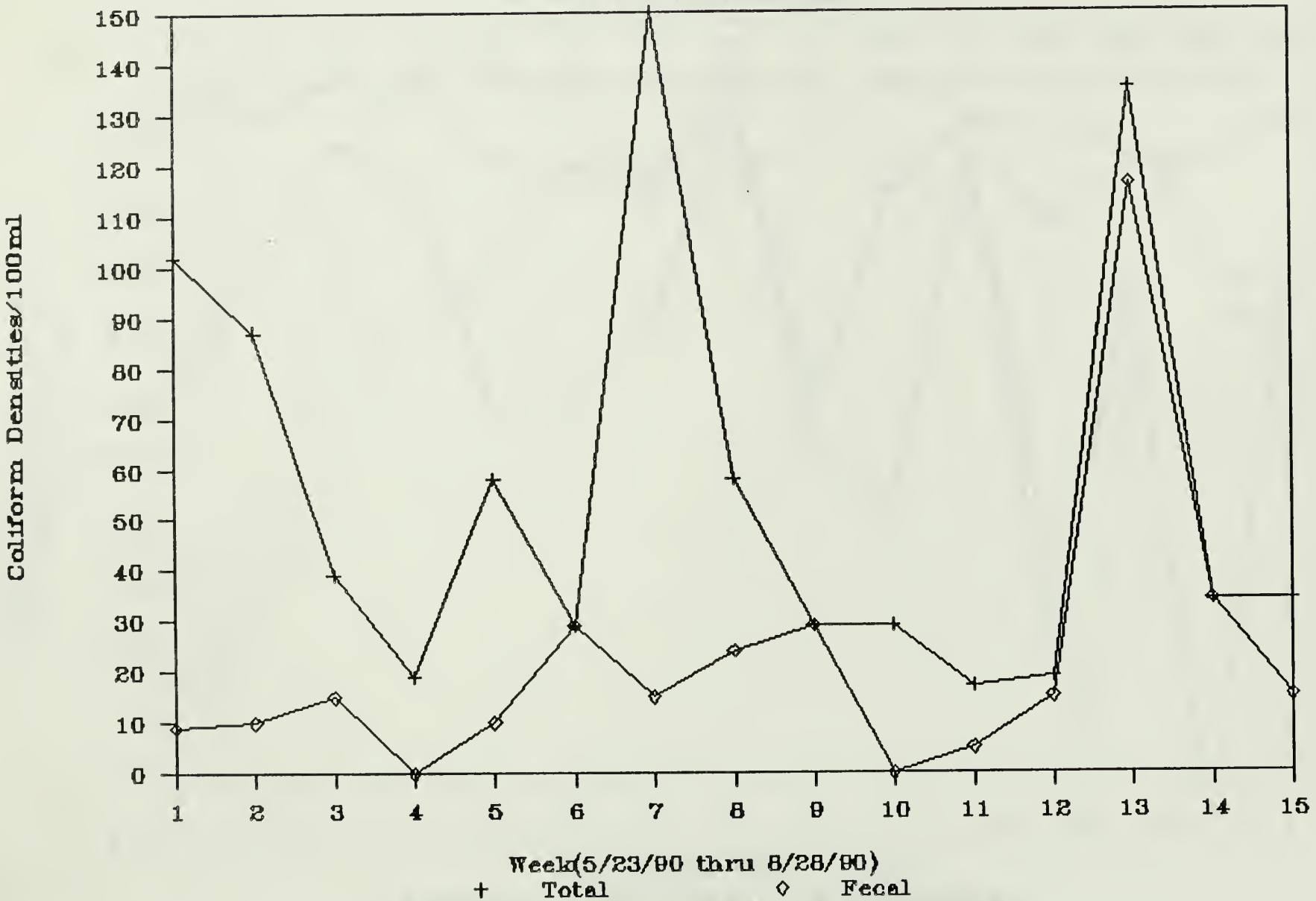
Weekly Coliform Averages

for Staten Island



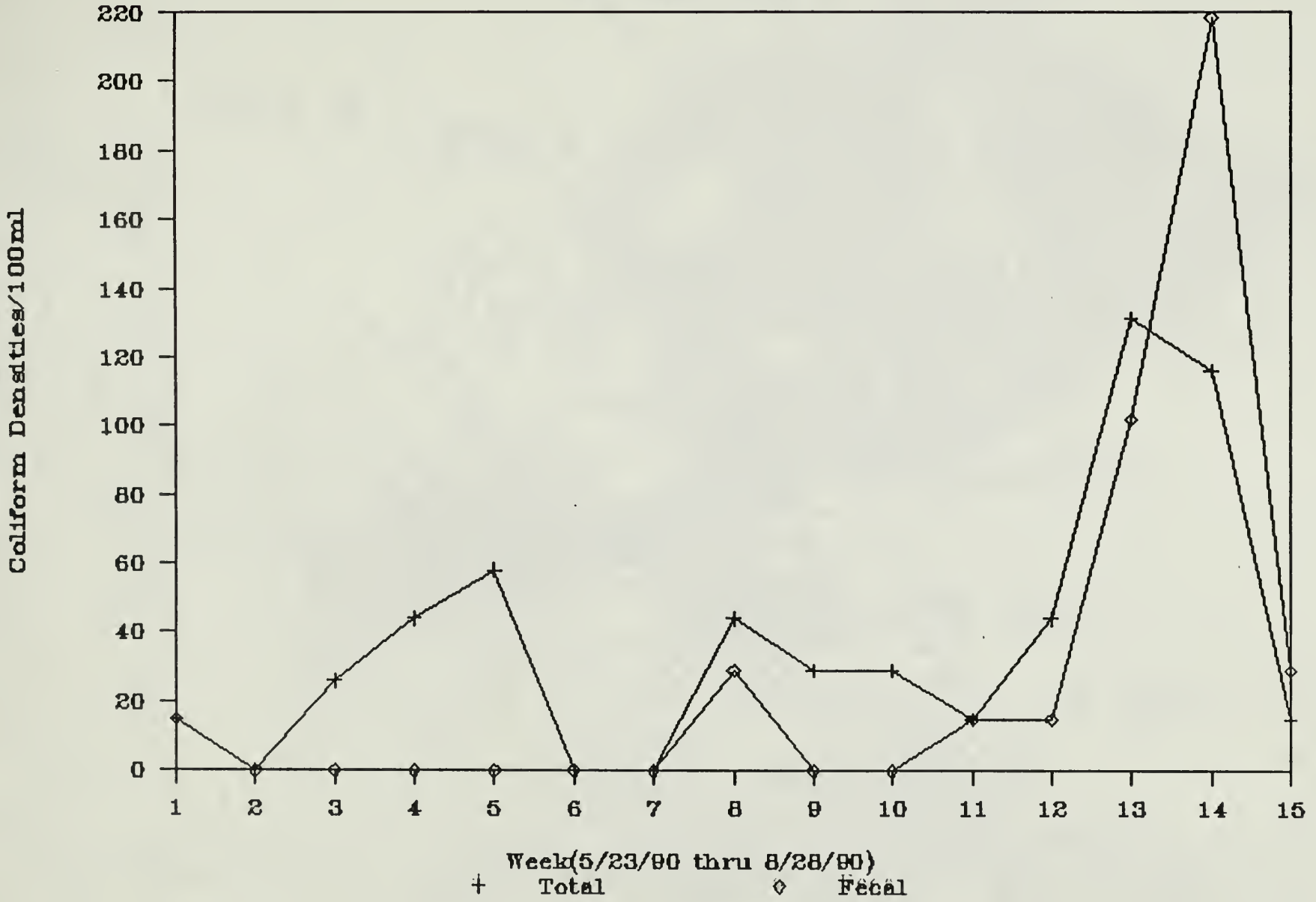
Weekly Coliform Averages

for Sandy Hook



Weekly Coliform Averages

for Breezy Point



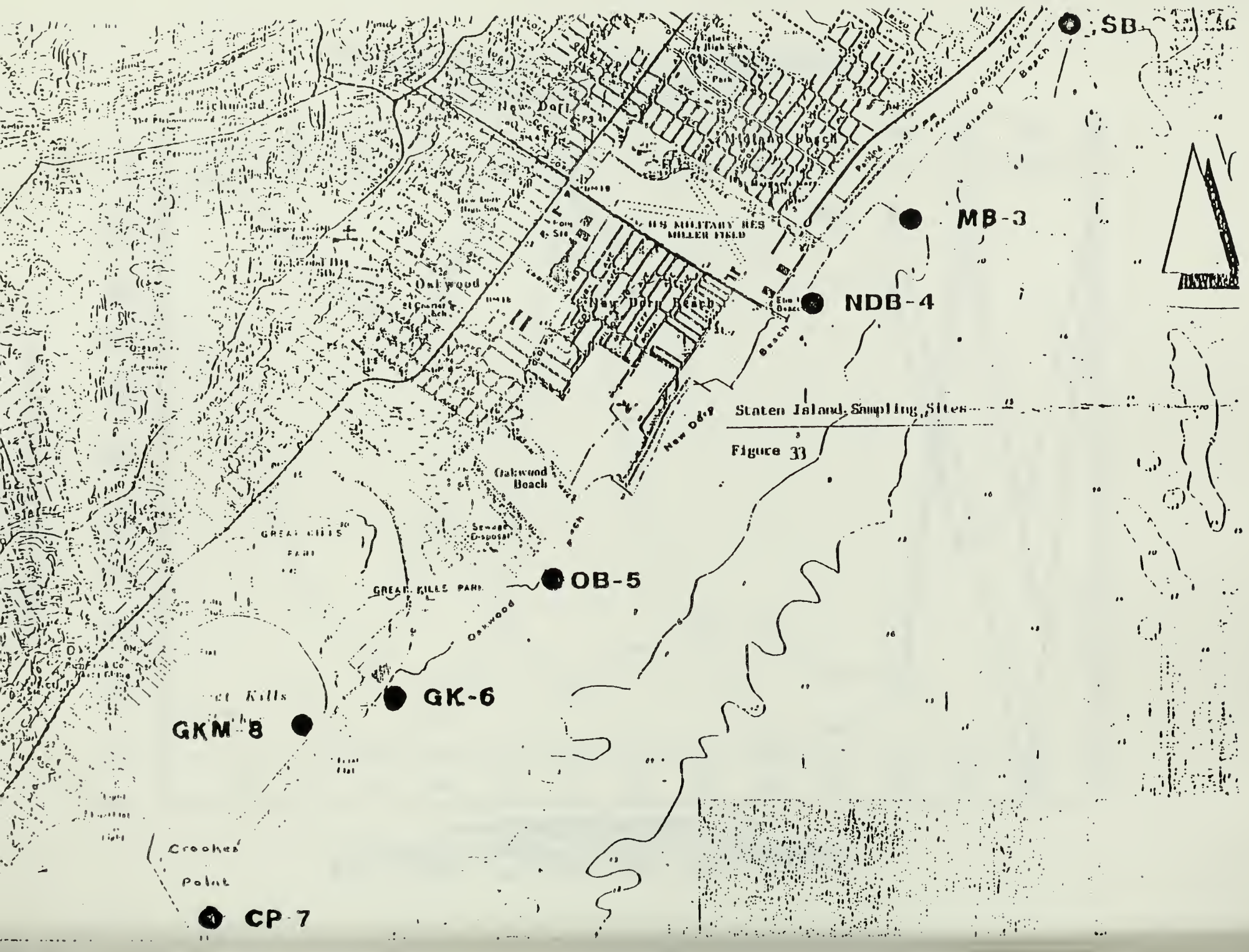
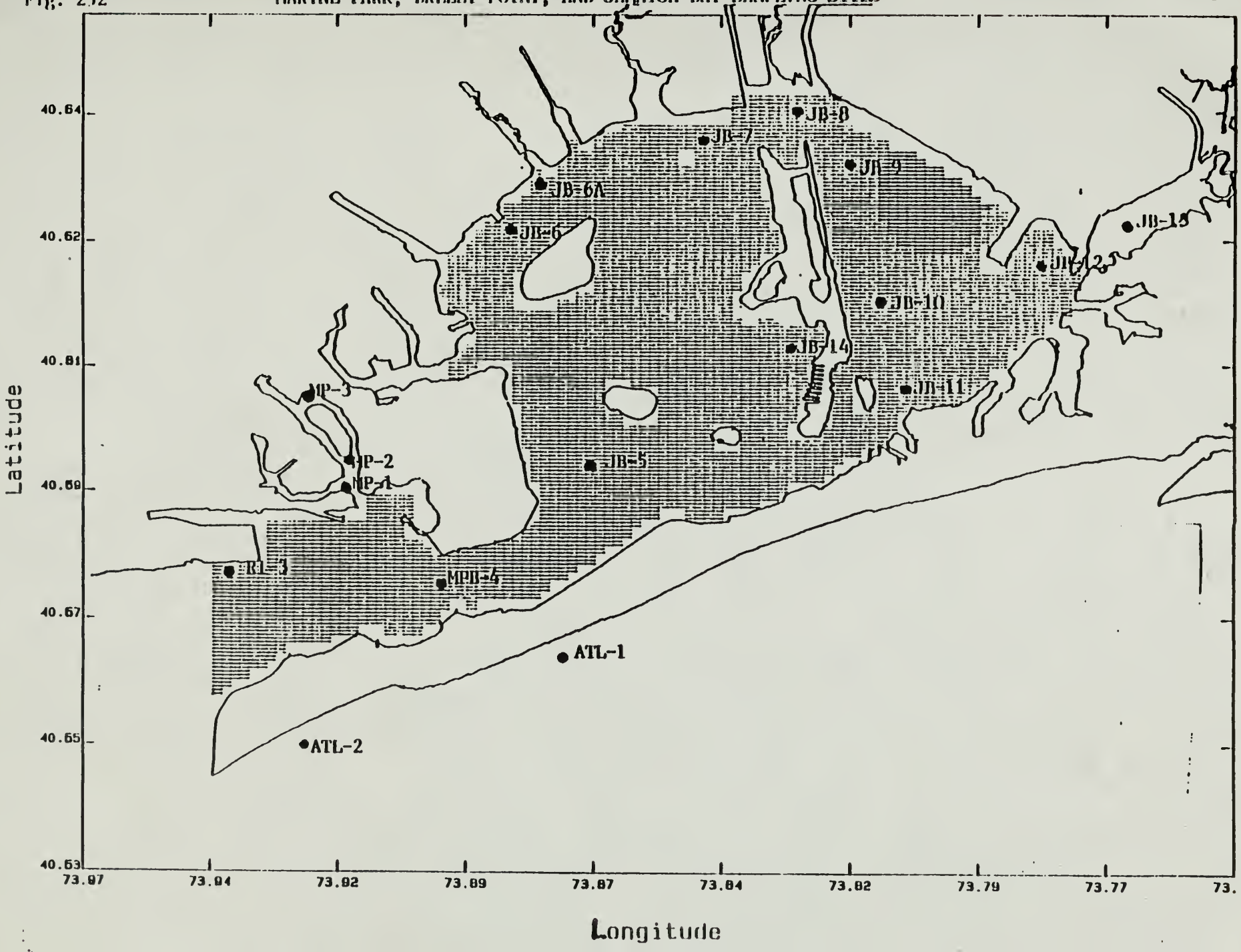

SB
MB-3
NDB-4
OB-5
GK-6
GKM-8
CP-7
Oakwood Beach
Great Kills Park
Crooked Point
New Dorp Beach
Midland Beach
Staten Island Sampling Sites
Figure 33

Fig. 252 MARINE PARK, BREEZY POINT, AND JAMAICA BAY SAMPLING SITES




SANDY HOOK CHANNEL (east section)
SANDY HOOK CHANNEL
FALSE HOOK CHANNEL
SANDY HOOK
SANDY HOOK BAY
SANDY HOOK PT
SANDY HOOK LIGHT
TERMINAL CHANNEL
HOOK TOWER
Highland Beach
Navesink R
Highlands
CUPOLA
Waterwitch
BLDG
HIGHLANDS OF NAVESINK
Navesink Park
Atlantic Highlands
Municipal Harbor
LARGEST GAS TANK
MICRO TOWER
STANDPIPE
TOWER
Caution: areas
Fish trap
Bay outside
SE CHART 12327